

Coral Zonation of the Mississippian System in the Western Interior Province of North America

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By WILLIAM J. SANDO *and* E. WAYNE BAMBER

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*A biostratigraphic zonation of the Mississippian
rocks of parts of the Western United States
and Western Canada, based on corals*



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4. *Duncanopora*, *Ekvasophyllum*, *Faberophyllum*.
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CORAL ZONATION OF THE MISSISSIPPIAN SYSTEM IN THE WESTERN INTERIOR PROVINCE OF NORTH AMERICA

By WILLIAM J. SANDO and E. WAYNE BAMBER¹

ABSTRACT

Analysis of the distribution of coral taxa, principally genera and subgenera, in the Mississippian of the Western Interior Province of Canada and the conterminous United States permits recognition of a system of coral zones and subzones useful for correlating stratigraphic units throughout an area extending from the southwestern District of Mackenzie in the Northwest Territories of Canada to southern California in the United States. The zonation comprises six Opel zones, four of which are divided into locally useful subzones. Coral Zone I corresponds approximately to the Kinderhookian Provincial Series and is divided into Subzones A, B, and C. Coral Zone II corresponds approximately to the Osagean Provincial Series and is divided into Subzones A and B. The Tournaisian Stage of western Europe is represented by Coral Zones I and II. Coral Zone III corresponds approximately to the lower and middle parts of the Meramecian Provincial Series and is divided into Subzones A, B, C, and D. Coral Zone IV corresponds approximately to the upper part of the Meramecian and is not divided. Coral Zone V corresponds approximately to the lower and middle parts of the Chesterian Provincial Series and is divided into Subzones A and B. Coral Zone VI corresponds approximately to the upper part of the Chesterian and is not divided. The Visean Stage of western Europe is represented by Coral Zones III and IV and Subzone VA. The lower part of the Namurian Stage of western Europe is represented by Coral Subzone VB and Zone VI. Deep-water and shallow-water coral biofacies are discussed and integrated into the zonation system.

The coral zones are correlated with foraminifer and conodont zones, which provide the primary bases for establishing ranges of coral taxa. Forty-five coral genera and subgenera used in the zonation are diagnosed, discussed, and illustrated. Correlations of Mississippian formations in the Western United States and Western Canada are presented as examples of the utility of the coral zonation.

INTRODUCTION

Although planktonic and nektonic groups such as conodonts and cephalopods are generally regarded as the best zonal fossils for biostratigraphy in the Carboniferous, corals are among the most widely used groups of sessile benthos for zonation and correlation because of their abundance in widespread shallow-water carbonate lithofacies, particularly in the Mississippian.

The widespread distribution of certain coral biofacies is evidently the result of their free-swimming larval stage, which in some modern corals may be as long as 2 months (Sando, 1977b, p. 490). Within parts of North America, the geochronometric resolution of Mississippian coral zones compares favorably with that of zones based on foraminifers, conodonts, and cephalopods (Sando, 1977a, p. 10; 1977b, p. 494), but corals, because of their greater provinciality, are less useful than these more rapidly and widely dispersed groups of fossils for detailed worldwide zonation and correlation. North American Mississippian corals are more abundant and widely distributed than conodonts and cephalopods in shallow-water carbonate facies, and they are more abundant and widely distributed than foraminifers in deep-water carbonate facies. Corals are more practical than microfossils for field biostratigraphy because many taxa useful for zonation can be identified with a hand lens, whereas microfossils can seldom be identified in the field. Corals are also less susceptible to destruction by recrystallization and dolomitization than are foraminifers.

Studies of the distribution of North American Mississippian corals (Sando, Bamber, and Armstrong, 1975, 1977) indicated high degrees of similarity between the coral faunas of western Canada and those of the conterminous western United States throughout Mississippian time, owing to continuity of shallow-water environments conducive to gene flow. These studies led to recognition of a large zoogeographic province, the Western Interior Province, which includes the southwesternmost District of Mackenzie, northeastern and southeastern British Columbia, western and southern Alberta, and southern Saskatchewan in Canada (fig. 1), and northeastern Washington, Montana, western North and South Dakota, Wyoming, southeastern and south-central Idaho, eastern Nevada, Utah, western Colorado, southern California, and most of Arizona in the United States (fig. 2). Areas of coralliferous Mississippian rocks in northern and southeastern Alaska, the northern Yukon, northwestern Washington, central Oregon, and northern California were in different zoogeographic provinces during the

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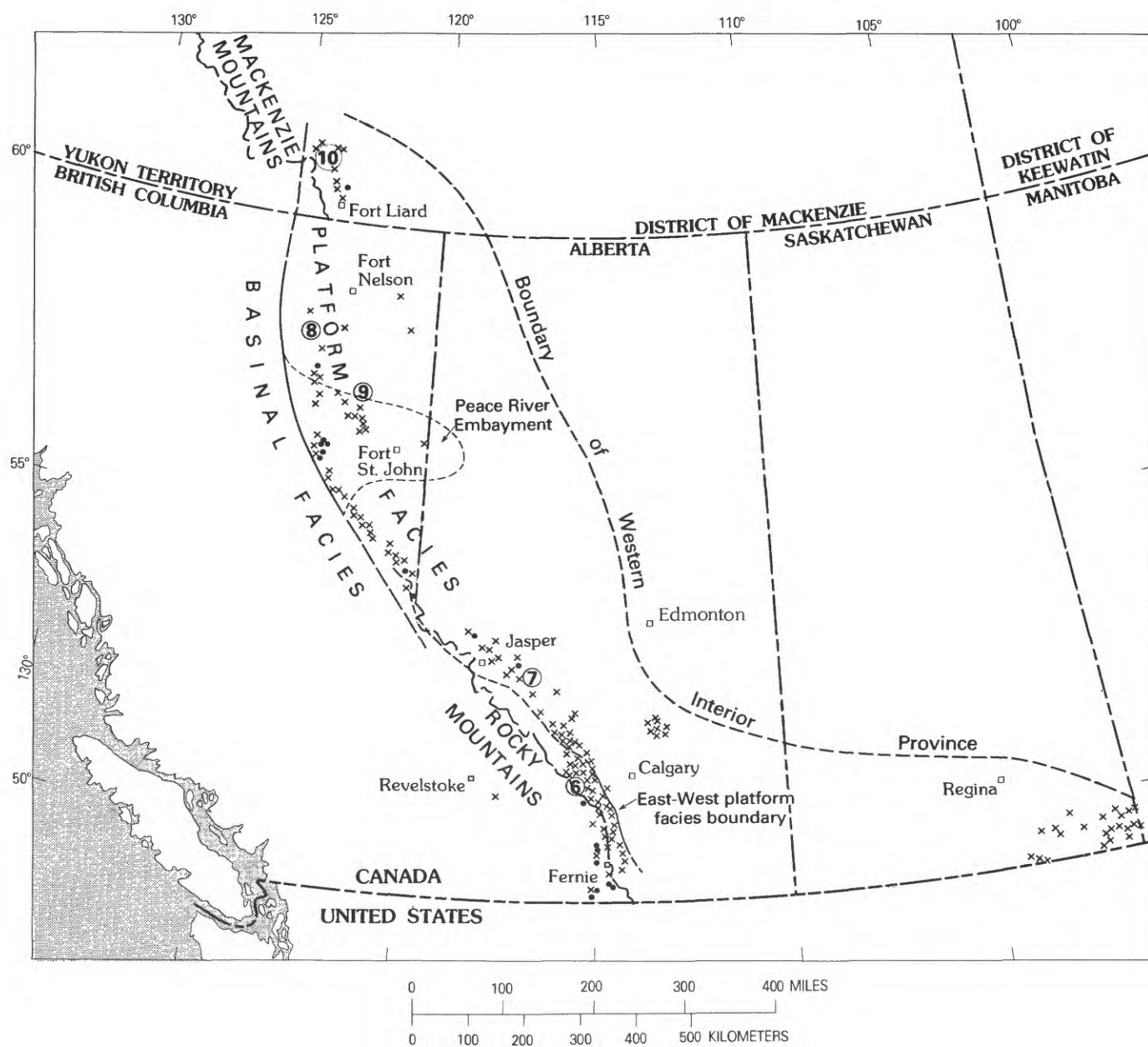


FIGURE 1.—Mississippian coral localities in the Western Interior Province of Canada. X, coralliferous stratigraphic section; dot, locality not in stratigraphic section; dashed line, boundaries of Western Interior Province; circled numbers, location of selected stratigraphic sequences shown on figure 10. Facies boundaries are from Macqueen and Bamber (1967) and Bamber, Macqueen, and Richards (1980).

Mississippian and are not considered in this report.

Preliminary tabulation of the stratigraphic ranges of genera and subgenera found in the United States and Canada in the Western Interior Province indicated that a unified Mississippian coral zonation is feasible for the entire area. A preliminary version of this new zonation was presented at the Ninth International Congress of Carboniferous Stratigraphy and Geology (Sando and Bamber, 1979, and in press). The present report is a more comprehensive account of the unified coral zonation for the Western Interior Province of North America.

ACKNOWLEDGMENTS

Stratigraphic ranges of coral taxa in this report are based mainly on correlations by means of foraminifer and conodont zones. We are greatly indebted to B. L. Mamet, Université de Montréal, Montréal, P.Q., Canada, and C. A. Sandberg, U.S. Geological Survey, Denver, Colo., for zonal identifications of foraminifers and conodonts, respectively; many of these identifica-

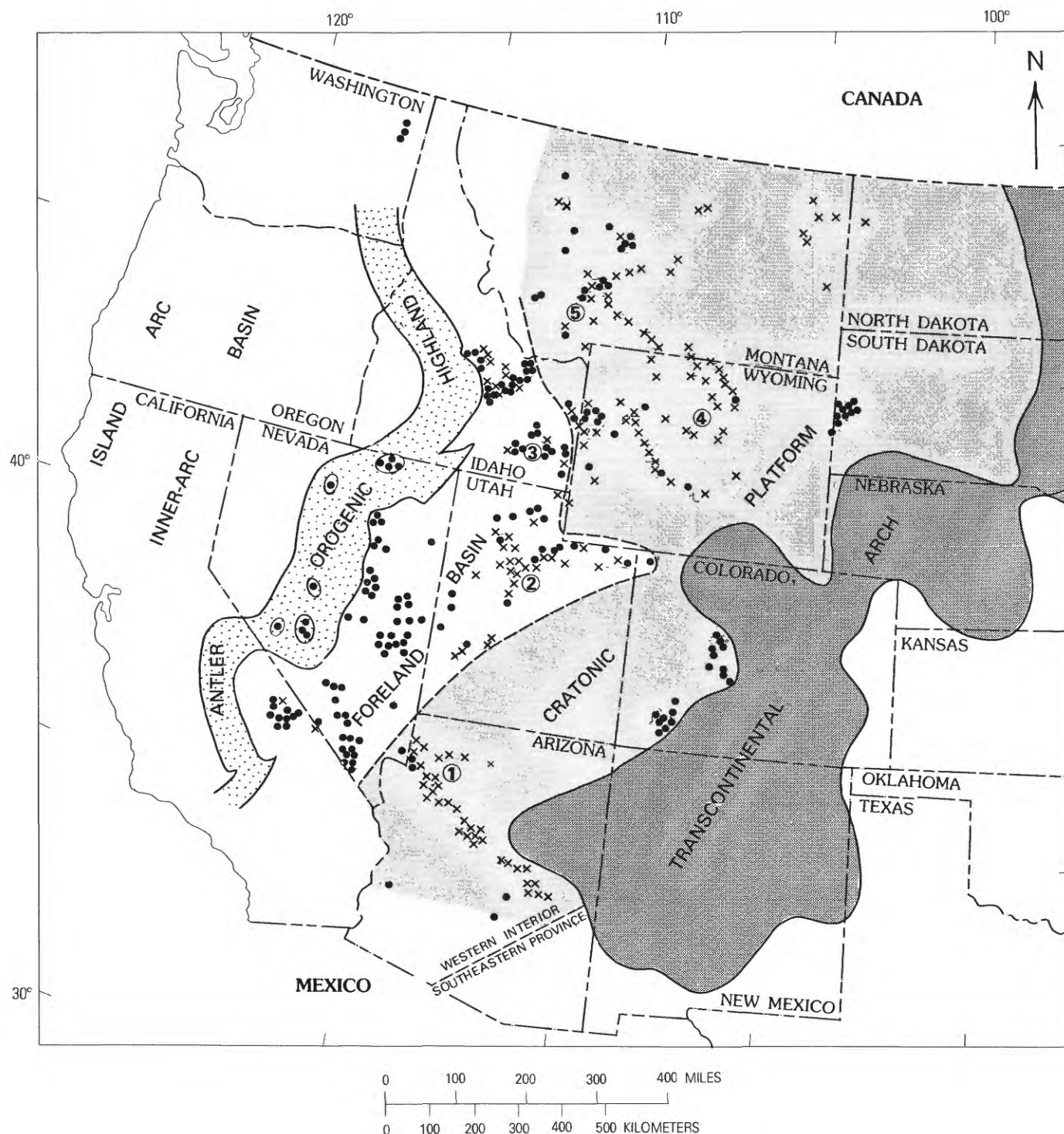


FIGURE 2.—Mississippian coral localities in the Western Interior Province of the United States. X, coralliferous stratigraphic section; dot, coral locality not in stratigraphic section. Circled numbers, locations of selected stratigraphic sequences shown on figure 10. Major paleotectonic units from Poole and Sandberg (1977, fig. 1). Craton margin indicated by dashed line. Western Interior Province includes Antler orogenic highland (part), foreland basin, and cratonic platform.

tions are unpublished. We are also grateful to A. E. H. Pedder, Geological Survey of Canada, Calgary, Alberta, and J. T. Dutro, Jr., U.S. Geological Survey,

Washington, D.C., for helpful comments on the manuscript.

PREVIOUS WORK

The coral zonation described in this paper is part of an evolution of zonal concepts based on earlier work. Previous zonations in the Western Interior Province were summarized by Sando (1977a,b). In figure 3, the new unified zonation for the Western Interior Province

is compared with other zonations recognized since 1960 in the United States and Canada.

In Canada, earlier zonations by Harker and Raasch (1958), Nelson (1960, 1961), Macqueen and Bamber (1968), and Macqueen, Bamber, and Mamet (1972) contributed to the new system. Descriptive work by Shimer (1926), Warren (1927), Kelly (1942), Harker and McLaren (1950), Crickmay (1955), Sutherland (1954, 1958), Nelson (1959, 1960, 1962a,b, 1977), and Bamber (1966, 1969) contributed to the taxonomic base for biostratigraphic analysis.

In the United States, earlier zonations by Parks (1951), Sando (1960a, 1964, 1967, 1969), Sando and Dutro (1960), Dutro and Sando (1963), and Sando, Mamet, and Dutro (1969) formed the foundation for the new scheme. Descriptive studies by Parks (1951), Easton and Gutschick (1953), Langenheim and Tischler (1960), Stensaas and Langenheim (1960), Easton (1962), and Sando (1960b, 1961, 1963, 1965, 1969, 1972a, 1975b, 1976a, 1977d, 1983) laid the taxonomic groundwork.

PROCEDURE

This analysis is based on the distribution of Mississippian corals at 360 localities in the United States (fig. 2), of which 155 are detailed measured stratigraphic sections, and at 175 localities in Canada (fig. 1), of which 157 are detailed measured stratigraphic sections. The localities are described in the locality register at the end of the report. In the United States, an estimated 10,000 specimens were assigned to 45 genera or subgenera; in Canada, an estimated 8,000 specimens were assigned to 34 genera or subgenera. Zonal taxa are diagnosed and discussed in another part of this report.

The occurrences and ranges of coral taxa were plotted on lithic logs along with boundaries of stratigraphic units, foraminifer zones of B. L. Mamet (Mamet and Skipp, 1970a,b), and conodont zones of C. A. Sandberg (in Sando, Sandberg, and Gutschick, 1981). Correlation charts were prepared for principal areas of coral occurrences, and stratigraphic units were correlated by means of foraminifer and conodont zones and, to a limited extent, by physical stratigraphy.

Data on the tops and bottoms of coral ranges in each stratigraphic section with respect to lithostratigraphic units, foraminifer zones, and conodont zones were col-

KINDERHOOKIAN		OSAGEAN		MERAMECIAN		CHESTERIAN		NORTH AMERICAN PROVINCIAL SERIES	
TOURNAISIAN				VISEAN				NAMURIAN (LOWER PART)	
Not zoned	PRE-7	isosticha-Upper crenulata		7		13		16i	
		Lower crenulata		8		12		16s	
		sandbergi		9		11		17	
		duplicata	U L	10		10		18	
		sulcata		11		9		19	
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FIGURE 3.—Correlation chart comparing new Western Interior coral zonation with other coral zonations (since 1960) in the United States and Canada and with foraminifer and conodont zones.

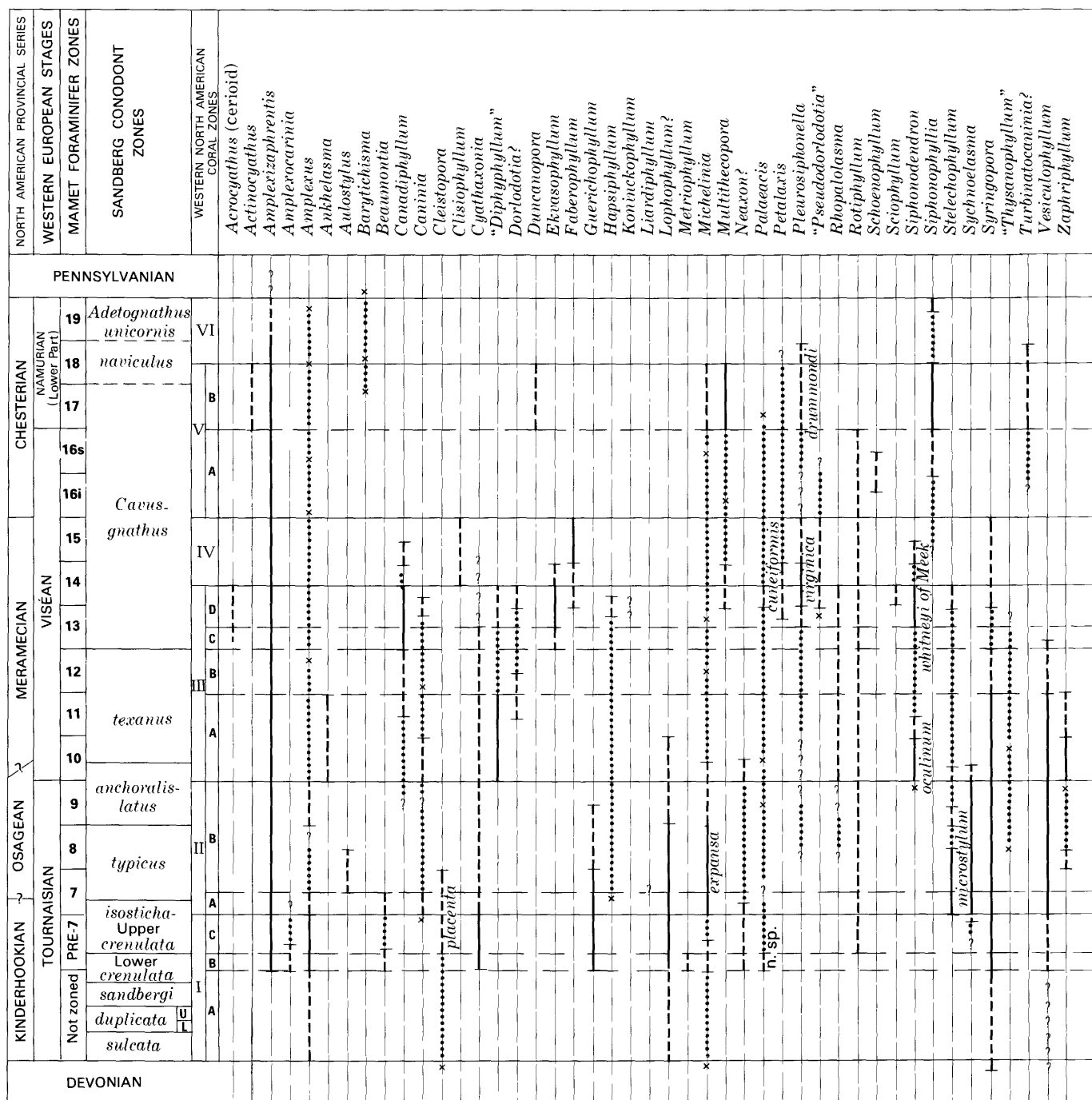


FIGURE 4.—Composite ranges of coral taxa in the Western Interior Province of the United States, and foraminifer, conodont, and coral zones in relation to North American Mississippian provincial series and western European Carboniferous stages. X, single occurrence; query, questionable occurrence; dotted line, interval of no occurrence joining intervals of occurrence; dashed line, continuous rare occurrence; solid line, continuous common to abundant occurrence.

lated and tabulated for each taxon, as were similar, less precise data on occurrences of coral taxa at localities not in detailed stratigraphic sections. Ranges were crosschecked by examining associations of taxa found at isolated localities.

Charts showing composite ranges of taxa in the United States (fig. 4) and Canada (fig. 5) were compiled by integrating the range data from individual stratigraphic sections. Variations in abundance (frequency of occurrence) at different stratigraphic levels were also noted

CORAL ZONATION, MISSISSIPPIAN SYSTEM, WESTERN INTERIOR PROVINCE

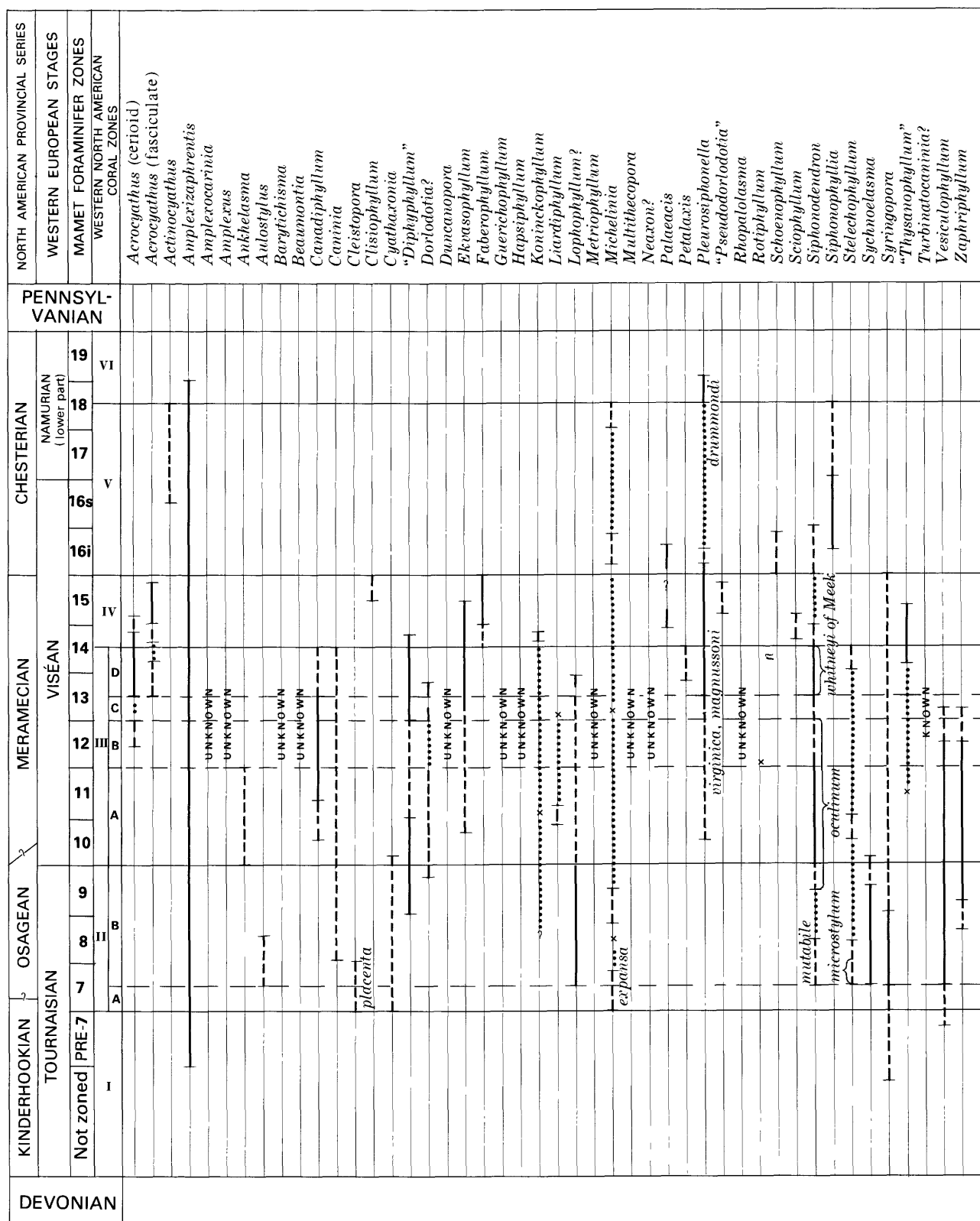


FIGURE 5.—Composite ranges of coral taxa in the Western Interior Province of Canada, and foraminifer and coral zones in relation to North American Mississippian provincial series and western European Carboniferous stages. See explanation on figure 4 for definition of occurrence symbols.

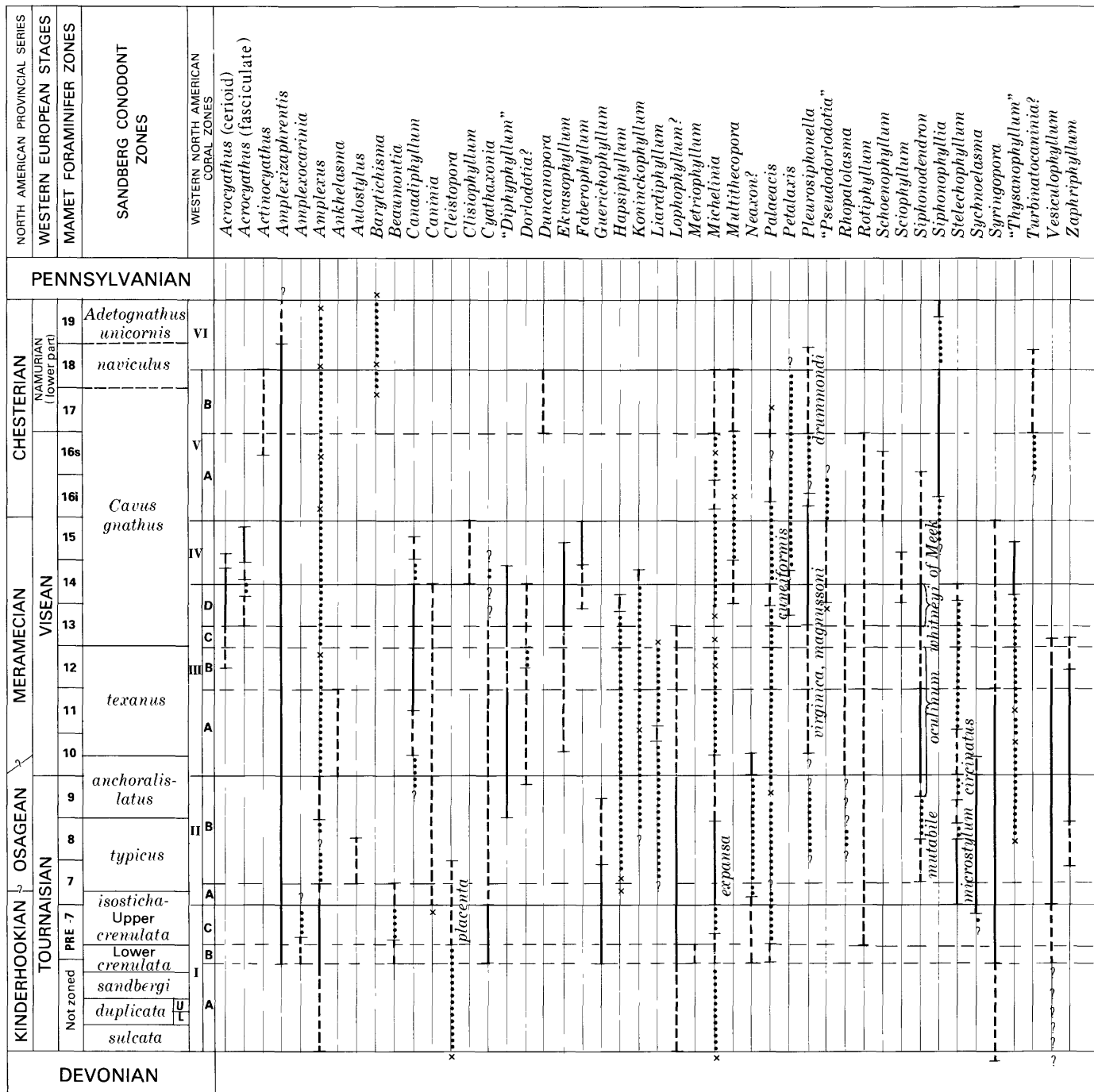


FIGURE 6.—Combined composite ranges of coral taxa in the Western Interior Province of the United States and Canada, and foraminifer, conodont, and coral zones in relation to North American Mississippian provincial series and western European Carboniferous stages. See explanation on figure 4 for definition of occurrence symbols.

and are shown on these composite charts. The composite range of each taxon established from measured sections was checked against data from other localities for any discrepancies.

Composite range charts for the United States and Canada were superimposed to produce a combined

United States-Canada range chart (fig. 6). This chart was then used to identify all taxon range limits and changes in frequency of occurrence. The same identification procedure was followed on the composite range charts for the United States and Canada. Important discontinuities in range or frequency of occurrence of

taxa were given numerical values dependent on the number of individual taxon range breaks observed on the three charts. The probability of recognizing major discontinuities in both the United States and Canada was then evaluated empirically. Through this process,

boundaries of zones and subzones were established at significant discontinuities. Another version of the combined United States-Canada range chart was constructed to show taxa arranged in ascending order of bases of ranges (fig. 7).

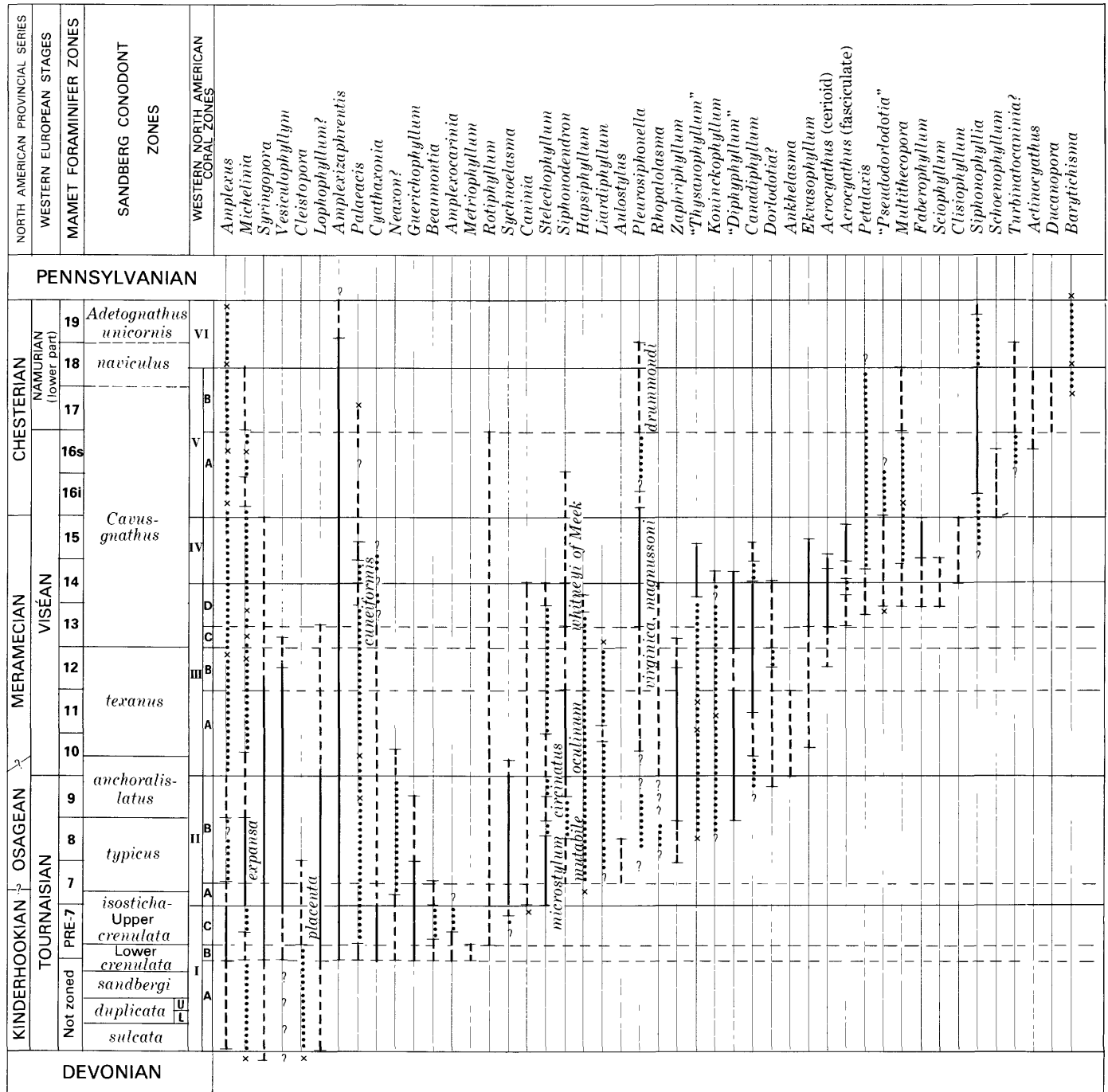


FIGURE 7.—Composite range chart in which coral taxa are arranged in ascending order of bases of ranges. See explanation on figure 4 for definition of occurrence symbols.

DEFINITION OF CORAL ZONES AND SUBZONES

The coral zones are Oppel zones as described by Hedberg (1976, p. 57–58). Each zone is characterized by an association of selected taxa of restricted and largely concurrent range, and the boundaries of the zone are marked by first or last appearances or by changes in abundance (frequency of occurrence) of selected taxa. Index taxa are mostly genera and subgenera, but species are used to a limited extent where their distribution is well known.

The zones are divided into subzones that may or may not be recognizable in both the United States and Canada. The subzones are based on the same criteria as the zones but are generally characterized by fewer index taxa and are commonly of more limited areal extent.

Although the zones and subzones are established here as formal biostratigraphic units, the use of fossil names for these units has been avoided because the taxonomy is in a state of flux and the use of fossil names would create an unstable zonal nomenclature. Instead, zones are identified by Roman numerals; subzones are identified by letters.

INFLUENCE OF ENVIRONMENT ON ZONATION

The stratigraphic and geographic distribution of coral taxa is influenced by differences in the environments in which the corals lived. In a study of the paleoecology of Mississippian corals from the Western Interior Province of the United States, Sando (1980) determined the occurrences of 46 taxa in each of six lithofacies representing environments ranging from more than 100 m below sea level in deep basins far from shore to a few meters or less below sea level in shoals and tidal flats at the shoreline (fig. 8). The taxa analyzed in Sando's study are the same as those used in the zonation system described herein. Although no similar analysis has been made for Canada, we assume that the conclusions are valid for Canada as well.

Sando (1980) grouped the occurrences of coral taxa into deep-water and shallow-water facies and derived a shallow-water habitat index (SWHI) that represented the percentage of occurrences of each taxon in shallow-water lithofacies. Thus, taxa having SWHI less than 50 were regarded as deep-water biofacies, and those having SWHI greater than 50 were regarded as shallow-water biofacies. The biofacies classification and lithofacies distribution of all the taxa used in zonation are summarized in figure 9.

Recognition of deep-water and shallow-water biofacies has an important bearing on zonation because some zones that represent the same time interval are

represented by different assemblages of taxa in different geographic areas. Lack of understanding of this relationship caused incorrect correlations of some stratigraphic units in the past. In the description of the coral zones presented below, biofacies factors are discussed and integrated into the zonation concepts.

DESCRIPTION OF CORAL ZONES I–VI

CORAL ZONE I

The lowest zone is a generally poorly coralliferous unit that corresponds approximately to the Kinderhookian Provincial Series. Coral Zone I corresponds to five *Siphonodella* conodont zones of Sandberg and others (1978) and includes Foraminifer Zone pre-7 (fig. 6). Although the United States–Canada composite range charts (figs. 6 and 7) show 17 genera in this zone, only 3 genera have been found in the unit in Canada (fig. 5), and 10 genera are rare in the unit in the United States (fig. 4). *Metriophyllum*, although known from the older Devonian, is unknown immediately below Coral Zone I and is not known above it. *Amplexocarinia* may be confined to the zone. Other genera that are not known below this unit in the Western Interior Province are *Amplexizaphrentis*, *Beaumontia*, *Guerichophyllum*, *Cyathaxonia*, *Lophophyllum*?, *Palaeacis*, *Neaxon*?, and *Rotiphyllum*.

In the United States, the base of Coral Zone I is indistinctly marked by the first appearance of *Lophophyllum*?, which coincides with the base of the *sulcata* Conodont Zone. *Amplexus*, *Vesiculophyllum*?, and *Syringopora* are rare in the lower part of the coral zone but are also known from uppermost Devonian (upper Famennian) beds beneath the zone. For practical purposes of correlation, the base of Coral Zone I is identified by conodont correlation of the base of the Mississippian because of the rarity of corals immediately above and below the Devonian–Mississippian boundary.

Subzones A, B, and C of Zone I are recognizable in parts of the United States but not in Canada. Subzone IA includes rare *Lophophyllum*?, *Amplexus*, and *Vesiculophyllum*? found in the middle part of the Fitchville Formation (blue shaly limestone unit) of central Utah and possibly in the lower part of the Tin Mountain Limestone of southern California. Elsewhere in the Cordilleran region of the United States, this stratigraphic interval is missing or represented by non-coralliferous strata. In Canada, the interval is represented partly by hiatus and partly by non-coralliferous terrigenous beds in the Yohin, Besa River, Bakken, and Exshaw Formations. Subzone IA corresponds to the *sulcata*, *duplicata*, and *sandbergi* Conodont Zones and the lower part of the Lower *crenulata* Conodont Zone.

Subzone IB is marked by a distinctive assemblage consisting of *Amplexizaphrentis*, *Amplexocarinia*, *Amplexus*, *Beaumontia*, *Guerichophyllum*, *Cyathaxonia*, *Lophophyllum*?, *Metriophyllum*, *Michelinia*, *Palaeacis*, *Neaxon*?, and *Syringopora*. *Vesiculophyllum* does not occur with this assemblage but is present in the same interval. The base of this subzone is marked by the first

occurrence of eight genera. *Metriophyllum* and a new species of *Palaeacis* are confined to the subzone. The principal occurrence of this assemblage is in transgressive glauconitic crinoidal limestone that marks the base of the Paine Member of the Lodgepole Limestone in southwestern Montana, southeastern Idaho, and northern Utah. The subzone may be more widespread

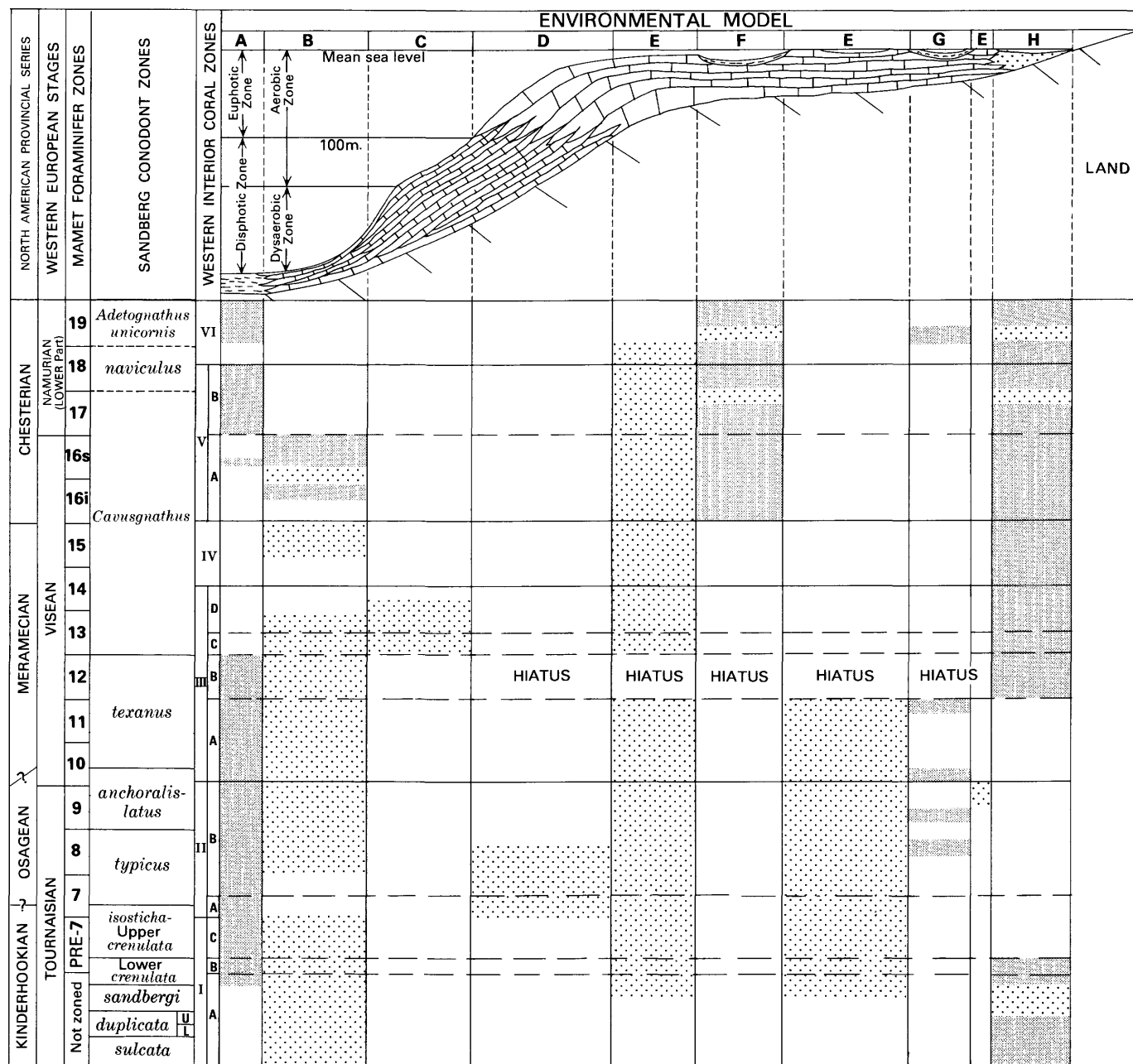


FIGURE 8.—Distribution of Mississippian lithofacies with respect to biostratigraphic zonations and generalized environmental model (modified from Sando, 1980). A, deep-water basinal terrigenous facies; B, deep-water basinal carbonate facies; C, deep-water bank carbonate facies; D, shallow-water basinal carbonate facies; E, shallow-water shelf carbonate facies; F, red-bed facies; G, evaporite and evaporitic carbonate facies; H, shallow-water terrigenous facies. Coralliferous lithofacies are stippled; noncoralliferous lithofacies are shaded. Nonpatterned intervals indicate absence of lithofacies. Environmental model not to scale; vertical dimension greatly exaggerated.

than is presently known, because the small size of most of the index taxa makes recognition difficult except in silicified collections. In Canada, this interval is represented by noncoralliferous terrigenous beds in the Besa River, Clausen, and Banff Formations. Subzone IB corresponds to the upper part of the Lower *crenulata* Conodont Zone.

Subzone IC is a poorly coralliferous interval between the top of subzone IB and the top of Coral Zone I. Nine genera range into this subzone from below, and only two taxa, *Cleistopora placenta* (White) and *Sychnoelasma* (very rare) first appear in the unit. In the United States, two biofacies may be distinguished—a shallow-water biofacies characterized by rare *Amplexizaphrentis*, *Lophophyllum*?, *Syringopora*, and *Vesiculophyllum*, and a deep-water biofacies characterized by *Amplexizaphrentis*, *Amplexus*, *Guerichophyllum*, *Cleistopora* (rare), *Cyathaxonia*, *Lophophyllum*?, *Rotiphyllum*, and *Syringopora* (rare) (see Sando, 1980). The deep-water biofacies is found in dark, thin-bedded silty limestone of the Paine Member of the Lodgepole Limestone in Montana, Idaho, Utah, and western Wyoming. The shallow-water biofacies occurs in light-colored crinoidal dolomite of the Little Bighorn Member of the Madison Limestone in central and eastern Wyoming and in shallow-water carbonate rocks of the Whitmore Wash Member of the Redwall Limestone in Arizona and the lower part of the Pahasapa Limestone in South Dakota. In Canada, Subzone IC is not distinguished but correlates with the upper part of the Banff Formation, which contains *Amplexizaphrentis*, *Syringopora*, and *Vesiculophyllum*; it also correlates with noncoralliferous terrigenous beds in the Besa River and Clausen Formations. Subzone IC corresponds to all but the highest part of the *isosticha*-Upper *crenulata* Conodont Zone.

CORAL ZONE II

The second zone is a generally abundantly coralliferous unit that corresponds approximately to the Osagean Provincial Series. The top of the zone correlates with the top of the Tournaisian Stage of western Europe. Coral Zone II corresponds to Foraminifer Zones 7, 8, and 9 and to one conodont zone and parts of two others (fig. 6). The United States-Canada composite range charts (figs. 6, 7) show 29 genera (6 questionable) in this zone, 26 (5 questionable) of which occur in the United States (fig. 4) and 16 (1 questionable) in Canada (fig. 5). *Aulostylus* is the only genus confined to this unit, but three others are not known above it, and 13 others are not known below it.

The base of Coral Zone II is generally well marked in the United States by the first appearances of

Stelechophyllum microstylum (White) and *Michelinia expansa* White, and, in most places, the first appearances of *Sychnoelasma* and *Vesiculophyllum*. This stratigraphic level corresponds to the base of Foraminifer Zone 7. In Canada, the base of Coral Zone II is indistinctly marked by the first appearances of *Cleistopora*, *Cyathaxonia*, and *Michelinia*, all of which

TAXA (NUMBER OF LOCALITIES)	SWH	LITHOFACIES					
		DEEP WATER			SHALLOW WATER		
		B	C	D	E	F	H
Solitary Rugosa (*dissepimented)							
<i>Metriophyllum</i> (7)	0	19	—	—	—	—	—
<i>Neaxon</i> (9)	5	18	—	1	—	—	—
<i>Rhopalotasma</i> (9)	6	15	—	—	1	—	—
<i>Amplexocarinia</i> (7)	17	10	—	2	—	—	—
<i>Cyathaxonia</i> (39)	18	95	1	13	8	—	—
<i>Amplexus</i> (31)	29	60	—	19	5	1	—
* <i>Guerichophyllum</i> (14)	33	20	—	10	—	—	—
<i>Rotiphyllum</i> (18)	33	18	—	2	7	—	—
* <i>Koninkophyllum</i> (2)	50	—	1	—	1	—	—
<i>Canadiphyllum</i> (16)	66	3	10	—	25	—	—
<i>Amplexizaphrentis</i> (70)	74	103	4	137	167	—	2
<i>Lophophyllum</i> ? (43)	77	29	—	51	46	—	—
* <i>Caninia</i> (8)	91	1	—	2	8	—	—
* <i>Ekvasophyllum</i> (14)	95	—	3	—	52	—	—
* <i>Faberophyllum</i> (14)	96	3	—	—	66	—	—
<i>Sychnoelasma</i> (62)	97	13	—	189	178	—	—
* <i>Vesiculophyllum</i> (84)	98	12	—	245	247	—	—
<i>Siphonophyllia</i> (25)	99	1	—	—	64	—	3
<i>Ankhelesma</i> (8)	100	—	—	—	10	—	—
<i>Barytichisma</i> (1)	100	—	—	—	1	—	—
* <i>Chisiophyllum</i> (7)	100	—	—	—	10	—	—
<i>Hapsiphyllum</i> (4)	100	—	—	1	3	—	—
* <i>Liardiphyllum</i> (1)	100	—	—	1	—	—	—
* <i>Turbinatocarinia</i> ? (8)	100	—	—	—	12	—	—
* <i>Zaphriphyllum</i> (17)	100	—	—	—	31	—	—
Colonial Rugosa							
<i>Acrocyathus</i> (5)	100	—	—	—	10	—	—
<i>Aulostylus</i> (4)	100	—	—	3	1	—	—
" <i>Diphyphyllum</i> " (31)	100	—	—	—	42	—	—
<i>Dorlodotia</i> ? (1)	100	—	—	—	1	—	—
<i>Siphonodendron</i> (22)	100	—	—	—	33	—	—
<i>Actinocyathus</i> (5)	100	—	—	—	9	—	—
<i>Petalaxis</i> (1)	100	—	—	—	1	—	—
" <i>Pseudodorlodotia</i> " (7)	100	—	—	—	10	—	—
<i>Schoenophyllum</i> (1)	100	—	—	—	1	—	—
<i>Sciophyllum</i> (1)	100	—	—	—	1	—	—
<i>Stelechophyllum</i> (27)	100	—	—	41	7	—	—
" <i>Thysanophyllum</i> " (2)	100	—	—	—	2	—	—
Tabulata							
<i>Beaumontia</i> (1)	0	2	—	—	—	—	—
<i>Palaeaxis</i> (10)	11	25	—	—	3	—	—
<i>Cleistopora</i> (9)	64	5	—	9	—	—	—
<i>Michelinia</i> (34)	86	9	—	36	20	—	—
<i>Syringopora</i> (78)	95	19	—	127	205	—	3
<i>Duncanopora</i> (11)	100	—	—	—	17	—	—
<i>Multithecopora</i> (12)	100	—	—	—	21	—	—
<i>Pleurostrophomella</i> (19)	100	—	—	—	31	—	—

FIGURE 9.—Lithofacies distribution and shallow-water habitat index (SWHI) of coral taxa (modified from Sando, 1980). Number in parenthesis after each taxon is number of localities from which taxon has been recorded. Number in column under each lithofacies type is number of occurrences of taxon in that lithofacies. Taxa in each major group are arranged in increasing SWHI. Stippled taxa are predominantly deep-water forms (SWHI <50). Asterisks denote dissepimented solitary forms.

are rare. *Stelechophyllum*, *Sychnoelasma*, and abundant *Vesiculophyllum* do not appear until the middle of Foraminifer Zone 7, which marks the lowest level of favorable carbonate facies in the Canadian sequence.

Subzones IIA and IIB are recognized in both Canada and the United States. In Canada, the boundary between the subzones is marked by the first appearances of *Aulostylus*, *Siphonodendron*, *Lophophyllum*?, *Stelechophyllum*, *Sychnoelasma*, and in most places the first appearances of *Syringopora* and *Vesiculophyllum*. In the United States, this boundary is indistinctly marked by the first appearances of *Aulostylus* and *Hap-siphyllum* (very rare), and the disappearance of *Beaumontia*. A deep-water biofacies characterized by *Amplexizaphrentis*, *Amplexus*, *Guerichophyllum*, *Cyathaxonia*, *Michelinia* sp., *Rhopalolasma*?, and *Rotiphyllum* represents Subzone IIB in the phosphatic member of the Deseret Limestone in Utah and in equivalent beds in Idaho (see Sando, 1980). The more widely distributed shallow-water biofacies of Subzone IIB is characterized by *Amplexizaphrentis*, *Aulostylus*, *Lophophyllum*?, *Michelinia expansa* White, *Stelechophyllum*, *Sychnoelasma*, *Syringopora*, and *Vesiculophyllum*.

In the United States, Coral Zone II is best represented in the Woodhurst Member of the Lodgepole Limestone and the lower part of the Mission Canyon Limestone of Montana. In Canada, the zone includes the lower part of the Flett Formation in southwestern District of Mackenzie, the upper part of the Banff Formation, the lower part of the Livingstone Formation, the Pekisko and Shunda Formations of Alberta and British Columbia, and the Lodgepole and Mission Canyon Limestones of Saskatchewan. It correlates with noncoralliferous terrigenous beds in the upper part of the Besa River and Clausen Formations and the lower part of the Prophet Formation of northeastern British Columbia and southwestern District of Mackenzie.

CORAL ZONE III

The third zone is a thick unit that correlates approximately with the lower and middle parts of the Meramecian Provincial Series and the lower and middle parts of the Viséan Stage of western Europe. Coral Zone III corresponds to Foraminifer Zones 10, 11, 12, 13, and the lower half of 14 and to one conodont zone and parts of two others (fig. 6). The United States-Canada composite range charts (figs. 6 and 7) show 33 genera in this zone, 31 of which occur in the United States (fig. 4) and 23 in Canada (fig. 5). *Ankhelesma* is the only genus confined to the zone, but 11 others are not known above it, and 7 others are not known below it.

The base of Coral Zone III in the United States is well marked in the shallow-water biofacies by the first appearances of *Ankhelesma* and "*Diphyphyllum*," in most places by the first appearances of *Siphonodendron* and *Zaphriphyllum*, and by the disappearance of *Sychnoelasma* at most localities. This stratigraphic level corresponds to the base of Foraminifer Zone 10, which marks the base of the Viséan Stage and is the best approximation of the base of the Meramecian Provincial Series in the Western Interior Province. In Canada, the base of Coral Zone III is generally well marked by the first appearances of *Ankhelesma* and *Siphonodendron oculinum* Sando and by the disappearance of *Sychnoelasma* at most localities.

Zone III is divided into four subzones (IIIA-D). Subzone IIIA corresponds to Foraminifer Zones 10 and 11. In both the United States and Canada, it is characterized by *Ankhelesma*, "*Diphyphyllum*," *Siphonodendron oculinum* Sando, *Syringopora*, *Vesiculophyllum*, and *Zaphriphyllum*. In parts of Utah and Idaho, this interval is characterized by a deep-water biofacies similar to that in Subzone IIB (see Sando, 1980).

Subzone IIIB coincides with Foraminifer Zone 12. In Canada, the subzone is characterized by a continuation of most of the index taxa that occur in Subzone IIIA, but Subzone IIIB is marked by the absence of *Ankhelesma*, an abundance of *Canadiphyllum*, and the first appearance of *Acrocyathus* (cerioid). In the United States, this interval is missing, because of erosion, over most of the cratonic platform, except for a shallow-water biofacies in the Horseshoe Mesa Member of the Redwall Limestone in the Grand Canyon region of northern Arizona, where *Dorlodotia*?, *Syringopora*, and *Vesiculophyllum* characterize the unit. *Ankhelesma*, "*Diphyphyllum*," *Siphonodendron*, and *Zaphriphyllum* are unknown in Subzone IIIB in the United States. In parts of Utah and Idaho, the subzone is characterized by a deep-water biofacies that consists of *Amplexizaphrentis*, *Canadiphyllum*, *Cyathaxonia*, *Rhopalolasma*, and *Rotiphyllum* (see Sando, 1980).

Subzone IIIC coincides with the lower half of Foraminifer Zone 13. In the United States, the base of this subzone is marked by the first appearance of the abundant and widespread genus *Ekvasophyllum* and at most localities by the first appearance of *Canadiphyllum* (new species with widely flaring calice). In Canada, the base of Subzone IIIC is less distinctly marked by a break in the occurrence of cerioid *Acrocyathus*, an abundance of "*Diphyphyllum*," and renewed occurrence of *Dorlodotia*?

Subzone IIID corresponds to the interval from the middle of Foraminifer Zone 13 to the middle of Zone 14. In the United States, the base of this subzone is marked

by the first appearance of *Siphonodendron whitneyi* of Meek and the first appearance of undoubted *Pleurosiphonella virginica* (Butts). *Ekvasophyllum*, *Canadiphyllum*, and *Siphonodendron whitneyi* of Meek are abundant and widespread, and *Faberophyllum*, *Hapsiphyllum*, and cerioid *Acrocyathus* are rare in this subzone. Rare *Sciophyllum* is confined to the subzone. In Canada, the base of the subzone is marked by the first appearances of fasciculate *Acrocyathus* and *Siphonodendron whitneyi* of Meek. *Ekvasophyllum*, *Pleurosiphonella*, and cerioid *Acrocyathus* become common at this level.

Coral Zone III is represented in a large number of formations in the United States, including the upper parts of the Mission Canyon and Redwall Limestones and parts of the Deseret Limestone and Little Flat Formation. In Canada, the zone is included in the Turner Valley, Mount Head, Prophet, and Debolt Formations, and the upper parts of the Livingstone and Flett Formations.

CORAL ZONE IV

The fourth zone is a relatively thin unit that correlates approximately with the upper part of the Meramecian Provincial Series and the lower part of the upper division of the Viseán Stage of western Europe. Coral Zone IV corresponds to the upper half of Foraminifer Zone 14 and all of Zone 15, and to part of the *Cavusgnathus* Conodont Zone. The United States-Canada composite range charts (figs. 6 and 7) show 19 genera in this zone, 14 of which occur in Canada (fig. 5) and 13 in the United States (fig. 4). Although *Clisiophyllum* is the only genus confined to the zone, 12 other genera or subgenera are not known above it, and one other subgenus is not known below it. *Faberophyllum*, although not confined to the zone, is particularly characteristic of it.

The base of Coral Zone IV is well marked in the United States by the disappearances of cerioid *Acrocyathus*, "*Diphyphyllum*," *Dorlodotia*?, *Siphonodendron whitneyi* of Meek, *Palaeacis cuneiformis* Milne-Edwards, *Rhopalolasma*, *Sciophyllum*, and *Stelechophyllum*, a decrease in the number of occurrences of *Canadiphyllum* and *Ekvasophyllum*, and the first appearance of *Clisiophyllum*. In Canada, the zone is characterized by abundant "*Thysanophyllum*," fasciculate *Acrocyathus*?, large *Ekvasophyllum*, and *Faberophyllum*. Its base is marked by the disappearances of *Canadiphyllum*, *Caninia*, *Petalaxis*, *Stelechophyllum*, *Siphonodendron whitneyi* of Meek, and by the first appearance of *Faberophyllum*.

In the United States, Coral Zone IV is best known in the lower part of the Monroe Canyon Limestone and

Scott Peak Formation of Idaho and in the Humbug Formation and lower part of the Great Blue Formation of Utah. In Canada, the zone is present in the upper part of the Mount Head Formation of Alberta and southeastern British Columbia and in the lower part of the Golata Formation and the upper part of the Prophet Formation of northeastern British Columbia. It is partly correlative with noncoralliferous terrigenous beds in the lower part of the Mattson Formation of southwestern District of Mackenzie and the upper part of the Golata Formation of northeastern British Columbia.

CORAL ZONE V

The fifth zone is a thick unit that correlates with the lower and middle parts of the Chesterian Provincial Series and the upper part of the Viseán Stage and lower part of the Namurian Stage of western Europe. Coral Zone V corresponds to Foraminifer Zones 16i, 16s, 17, and the lower half of 18, and to part of the *Cavusgnathus* and lowermost *naviculus* Conodont Zones. The United States-Canada composite range charts (figs. 6 and 7) show 15 genera (one questionable) in this zone, all of which occur in the United States (fig. 4) and eight (one questionable) of which occur in Canada (fig. 5). *Duncanopora*, *Actinocyathus* and *Schoenophyllum* are confined to the zone. Seven other genera or subgenera are not known above it and two others are not known below it. *Siphonophyllia* is particularly characteristic.

The base of Coral Zone V is well marked in both the United States and Canada by the disappearance of the abundant and widespread genera *Faberophyllum*, *Clisiophyllum*, and *Syringopora*. In Canada, this stratigraphic level is distinguished further by the first appearance of *Schoenophyllum* and by the renewed occurrence of *Siphonodendron*.

Zone V is divided into Subzones VA and VB in the United States but not in Canada. The boundary between the subzones is marked by the first appearances of *Duncanopora*, *Actinocyathus*, and *Pleurosiphonella drummondi* (Nelson), the first appearances of *Siphonophyllia*, and *Multithecopora* at most localities, and the disappearance of *Rotiphyllum*.

In the United States, Coral Zone V is best represented in the upper part of the Monroe Canyon Limestone and in the uppermost part of the Scott Peak Formation and South Creek and Surret Canyon Formations of Idaho. In Canada, the zone is present in the Etherington Formation of Alberta and southeastern British Columbia and correlates with noncoralliferous terrigenous beds in the Mattson Formation of southwestern District of Mackenzie and the upper part of the Stoddart Group of northeastern British Columbia.

CORAL ZONE VI

The highest coral zone in the Mississippian of the Western Interior Province is a very poorly coralliferous unit that correlates with the upper part of the Chesterian Provincial Series and the lower part of the Lower Namurian of western Europe. Coral Zone VI corresponds to the upper half of Foraminifer Zone 18 and all of Zone 19. It also includes the *Adetognathus unicornis* Conodont Zone and the upper part of the *naviculus* Conodont Zone. The United States-Canada composite range charts (figs. 6 and 7) show only six genera in this zone, most of which are rare. In the United States, the zone includes all six genera (fig. 4), but in Canada, only two genera are known (fig. 5). All six of the index genera range into the zone from below, and only two of these are known above the zone. *Petalaxis* may be present in the zone in the United States.

The base of Coral Zone VI is recognized in the United States by the disappearances of *Duncanopora*, *Actinocyathus*, *Michelinia*, and *Multithecopora* and in Canada by the disappearances of *Siphonophyllia*, *Actinocyathus*, and *Michelinia*.

The top of Coral Zone VI is poorly marked because the immediately overlying Pennsylvanian beds are generally noncoralliferous. The base of the Pennsylvanian is most commonly determined by foraminifers (Zone 20), conodonts, or brachiopods.

In the United States, Coral Zone VI is best represented in the uppermost part of the Surret Canyon Formation and the Arco Hills and Bluebird Mountain Formations of Idaho and in Canada, in the uppermost part of the Etherington Formation of Alberta. At most localities, this interval is represented by noncoralliferous strata or by an hiatus.

APPLICATIONS OF THE CORAL ZONATION

The proposed coral zonation finds its main application in the correlation of significant Mississippian sequences from particular geographic areas within the Western Interior Province (fig. 10). The composite sections in figure 10 are based on two or more individual sections for a given geographic area. The zonation attains maximum utility if used in conjunction with biostratigraphic data from other fossil groups. Thus, each zonal boundary, be it based on corals, foraminifers, or conodonts, provides a correlation datum for comparing stratigraphic sequences and for checking the temporal relationships of lithostratigraphic datum planes.

The coral zonation is also useful for determining the stratigraphic position of coral collections of unknown or uncertain stratigraphic position, such as those made by geologists mapping in areas where the local stratigraphy is poorly known. By using the range charts (figs. 4-7),

assemblages of corals can be placed stratigraphically, with varying degrees of accuracy depending on the taxa present. Such determinations are of particular value in analyzing the geology of structurally complex areas.

Recognition of the zones and subzones in a given stratigraphic section will depend on the abundance and diversity of coral taxa and discovery of all taxa actually present. Ranges of individual taxa and assemblages of taxa at a single locality are seldom the same as the composite ranges upon which the zonation is based. Unfavorable environmental and collecting factors combine to make recognition of all possible zonal and subzonal boundaries extremely improbable at most localities. No single locality affords a complete sequence of zones and subzones for the entire Mississippian sequence. At most localities, zonal and subzonal boundaries can only be approximated within known limits. Therefore, the coral zonation may be limited in its application to detailed correlation of individual stratigraphic sections. Nonetheless, the zonal scheme provides an important biostratigraphic framework, linked to the standard foraminiferal and conodont zonations, to which coralliferous Mississippian sequences throughout the North American Western Interior Province may be related.

ZONAL TAXA

This section presents diagnoses, discussions, and remarks on the distribution of genera and subgenera used in the zonation; for convenience, these taxa are listed alphabetically. No attempt is made to classify the taxa above the generic level. Although the distribution of genera and subgenera is generally well known, much descriptive work remains to be done on species. Nominal species are listed for each genus, and their stratigraphic and geographic distribution are given. Morphologic terminology is generally that of Hill (1981). Remarks on ecologic occurrence refer to environments recognized by Sando (1980). Paleobiogeographic provinces are those recognized by Sando, Bamber, and Armstrong (1975, 1977).

Aulopora Goldfuss, 1829, *Cladochonus* McCoy, 1847, *Aulina* Smith, 1916, and *Favosites* Lamarck, 1816, are represented in the Western Interior Province but have not been included in the zonation. *Aulopora* and *Cladochonus* are seldom found except as fragments in silicified collections. To differentiate these genera from each other and from the young stage of *Syringopora* is commonly difficult, if not impossible. The only occurrences of *Aulina* are in residual chert overlying, and in solution cavities in, the Redwall Limestone of Arizona (Sando, 1969), where the chert was derived from a stratigraphic unit of uncertain age that was removed from the sequence by post-Redwall, pre-Supai erosion. *Favosites* is represented by *F. whitfieldi* White, 1874,

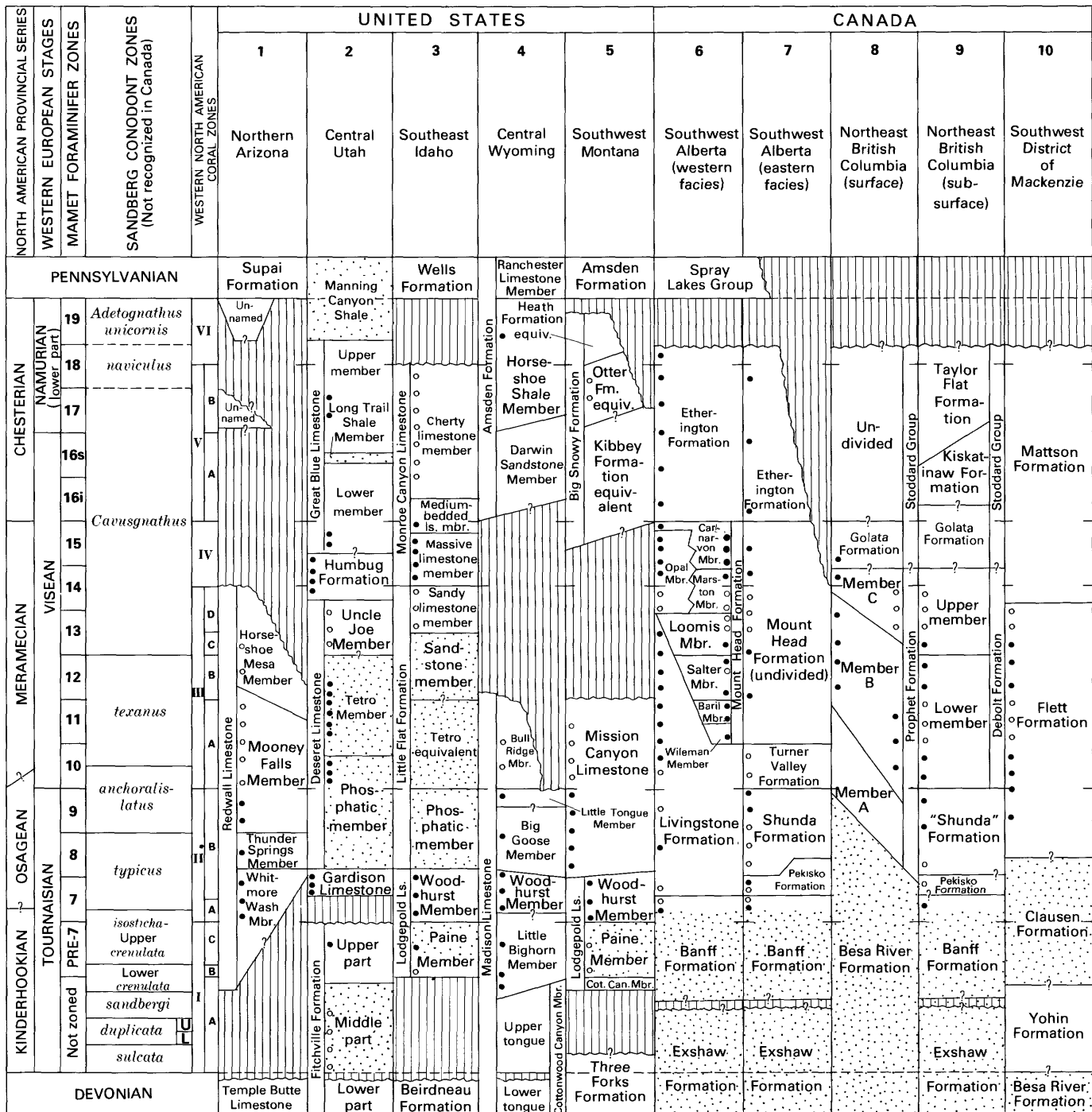


FIGURE 10.—Correlation of Mississippian stratigraphic units in selected areas of the Western Interior Province of the United States and Canada by means of foraminifer, conodont, and coral zones. Vertical line pattern denotes hiatus. Closed circles in stratigraphic columns denote occurrences of coral-zone index taxa; open circles denote occurrences of coral-subzone taxa. Shaded parts of stratigraphic columns indicate intervals of deep-water lithofacies. Locations of selected areas are shown on figures 1 and 2.

which was described from an obscure locality in Arizona. It has been found in the Redwall Limestone of Arizona and a locality in Nevada, but its exact stratigraphic position is unknown.

Repositories for figured specimens (pls. 1–10) are as follows: USNM, U.S. National Museum of Natural History, Washington, D.C.; MNA, Museum of Northern

Arizona, Flagstaff, Ariz.; UM, University of Missouri, Columbia, Mo.; GSC, Geological Survey of Canada, Ottawa, Ontario. Collections of the U.S. Geological Survey are designated by the prefix USGS and the suffix -PC, which indicates the upper Paleozoic catalog. Collections of the Geological Survey of Canada are designated GSC loc.

Genus ACROCYATHUS d'Orbigny, 1849

Plate 1, figures 5, 6, 10, 11

Diagnosis.—Cerioid and fasciculate colonial rugose corals. Major septa thin, seldom extending across tabularium to columella and ordinarily discontinuous or absent in dissepimentarium. Cardinal septum short and situated in a fossula formed by downwarped tabulae in some species. Counter septum long and extending to columella. Minor septa ordinarily absent or poorly developed. Columella ranging from a simple axial plate joined to counter septum to a complex spiderweb structure made up of axial plate, septal lamellae, and axial tabellae or upturned edges of tabulae. Tabulae ordinarily complete, conical, without well-defined shoulders, but may be nearly horizontal in some species. Peripheral tabellae rare. Dissepimentarium lonsdaleoid, commonly showing traces or crests of discontinuous septa in transverse section. Increase peripheral.

Nominal species in Western Interior Province.—Cerioid: *A. girtyi* (Hayasaka, 1936), *A. pennsylvanicus* (Shimer, 1926), *A. ? shimeri* (Crickmay, 1955). Fasciculate: *A. ? arizelum* (Crickmay, 1955), *A. subcaespitosus* (Meek, 1873).

Discussion.—This genus includes some of the corals previously referred to *Lithostrotionella* Yabe and Hayasaka, 1915. The taxonomy and world distribution of *Acrocyathus* have been discussed by Sando (1983). *Acrocyathus* was probably derived from *Stelechophyllum* in the Late Mississippian. It is the probable ancestor of *Petalaxis* and *Sciophyllum*.

Distribution.—The principal occurrence of *Acrocyathus* in North America is in the St. Louis Limestone and its equivalents in the Southeastern Province. In the Western Interior Province of the United States, cerioid forms are rare in the Little Flat and Aspen Range Formations and Monroe Canyon Limestone of Idaho, the Humbug Formation of Utah, the Banner Formation and Monte Cristo Limestone of Nevada, and possibly in the Perdido Formation of California. The cerioid species *A. girtyi* occurs in the Monroe Canyon Limestone of Utah. The fasciculate species *A. subcaespitosus* is known only from the Monroe Canyon Limestone in Idaho. The fasciculate form is also represented by undetermined species in the Monroe Canyon Limestone of Utah and in the Redwall Limestone of Arizona. The occurrences of the genus in the western United States are in Zones IIIC and D.

In Canada, *A. pennsylvanicus* and *A. ? shimeri* occur in the Mount Head Formation in Alberta and southeastern British Columbia and in the Prophet Formation of northeastern British Columbia. *A. ? arizelum* occurs in the Mount Head Formation of Alberta. The

Canadian occurrences are in Zones IIIB–D and IV. The genus occurs exclusively in the shallow-water shelf-carbonate facies.

Genus ACTINOCYATHUS d'Orbigny, 1849

Plate 6, figures 9, 10

Diagnosis.—Cerioid colonial rugose corals. Columella complex, composed of a median plate, septal lamellae, and conically arranged, shallowly curved tabellae. Major septa may or may not extend to columella. Minor septa short. Tabularium composed of flat or sagging tabulae. Dissepimentarium lonsdaleoid.

Nominal species in Western Interior Province.—*A. stelcki* (Nelson, 1960).

Discussion.—All specimens belonging to this subgenus in the Western Interior Province are referred to the nominal species. See Sando (1975b, p. C21–C23) for a detailed analysis of the species.

Distribution.—*Actinocyathus* is a relatively rare coral in both Canada and the United States. It is restricted to Zone VB in the United States and occurs in the upper part of Zone V in Canada. The subgenus is known from the Amsden Formation of Wyoming, the Surret Canyon Formation of Idaho, the Green Ravine Formation of Utah, and the Etherington Formation of Alberta and British Columbia. This taxon occurs exclusively in the shallow-water shelf-carbonate lithofacies.

Genus AMPLEXIZAPHRENTIS Vaughan, 1906

Plate 1, figures 7, 8

Diagnosis.—Small, solitary, ceratoid or trochoid rugose corals with a conspicuous cardinal fossula bounded laterally by cardinal lateral septa and axially by a wall consisting of fused axial ends of rhopaloid major septa of counter quadrants. Cardinal fossula ordinarily on concave side of corallum but may vary greatly in position in some species, generally expanded axially but may be parallel sided or axially constricted. Alar pseudofossulae commonly well developed. Septal plan ordinarily pinnate, although septal withdrawal in later growth stages may superimpose a radial plan in some species. Minor septa absent or poorly developed. Tabulae arched at axis of corallum and depressed in cardinal fossula. Dissepiments absent.

Nominal species in Western Interior Province.—*A. durhami* (Langenheim and Tischler, 1960); *A. elliptica* (White, 1862); *A. enniskilleni* (Milne-Edwards and Haime, 1851); *A. ? eumetria* (Crickmay, 1955); *A. excavata* (Girty, 1899); *A. persimilis* (Easton and Gutschick, 1953); *A. spinulosa* (Milne-Edwards and

Haime, 1851); *A. taylori* Sutherland, 1958; *A. tumida* (Easton, 1962); *A. indifferens* Sutherland, 1958.

A. elliptica includes the junior synonym *Zaphrentis carinatus* Worthen, 1890. *A. spinulosa* includes junior synonyms *Zaphrentis spinulifera* Hall in Hall and Whitney, 1858; *Z. spergenensis* Worthen, 1890; *Z. chesterensis* Worthen, 1890; and *Z. pellaensis* Worthen, 1890.

Discussion.—This genus, as presently recognized, includes corals previously assigned to *Zaphrentites* Hudson, 1941, and *Menophyllum* Milne-Edwards and Haime, 1850 (e.g., Sando, 1960b, 1969). The nominal species are in need of restudy, and large collections assigned to this taxon have never been studied at the species level. Detailed work on these collections would probably result in recognition of stratigraphically useful species.

Distribution.—*Amplexizaphrentis* is one of the commonest corals throughout the Mississippian of the Western Interior Province. It is represented in almost every coralliferous formation studied. Its stratigraphic range is from the base of Zone IB to the top of Zone VI. The genus occurs in a wide variety of lithofacies representing shallow- to deep-water habitats; it is most common in shallow-water environments.

Genus AMPLEXOCARINIA Soshkina, 1928

Plate 1, figures 1, 2

Diagnosis.—Small, solitary, ceratoid to cylindrical rugose corals in which a wide aulos is formed by downwardly bent edges of axial tabulae, dividing the lumen into axial and periaxial regions. Major septa short, abutting against aulos. Minor septa absent or poorly developed. Tabulae in aulos horizontal. Periaxial tabulae sloping downward toward periphery. Dissepiments ordinarily absent but may be present in some species.

Nominal species in Western Interior Province.—None.

Discussion.—Specimens from Montana were described by Sando (1960b) under the name of *Amplexocarinia* aff. *A. heimo* Heritsch, a Permian species.

Distribution.—*Amplexocarinia* is a rare coral with a short stratigraphic range in the Western Interior Province. It is known only from the Lodgepole Limestone of Montana and Utah, where it is in Zones IB and IC and may also be present in IIA. Although it is found in both deep-water and shallow-water lithofacies, the known occurrences are mainly in deep-water habitats. The apparent rarity of this taxon may be due partly to its diminutive size, which may cause it to go unnoticed except in silicified collections.

Genus AMPLEXUS Sowerby, 1814

Plate 1, figures 3, 4

Diagnosis.—Small to large, solitary, cylindrical to vermiform rugose corals. Major septa thin, short, amplexoid. Minor septa absent or poorly developed in mature stages. Tabulae widely spaced, flat, complete, sometimes with downturned edges. Dissepiments absent.

Nominal species in Western Interior Province.—None.

Discussion.—This genus is easily confused with *Guerichophyllum*, whose principal stratigraphic occurrence is about the same. *Guerichophyllum* differs from *Amplexus* by having a zaphrentoid early stage and by having dissepiments. Although nominal species are unknown, study of large collections should prove rewarding in establishing stratigraphically useful species.

Distribution.—*Amplexus* is common in Zones IB and IC but is known in Zone IA and in Zone IIB. It is very rare above Zone IIB, but sporadic single occurrences are known in Zones IIIB, VA and B, and VI. It is found in both shallow-water and deep-water lithofacies, but its principal occurrence is in deep-water habitats.

The genus is known mainly from the Lodgepole Limestone of Montana, Wyoming, Utah, and Idaho; the Allan Mountain Limestone of Montana; and the Deseret Limestone of Utah. It is rare in the Amsden Formation of Wyoming; the Great Blue Limestone, Surret Canyon Formation, and Scott Peak Formation of Idaho; the Brazer Dolomite, Gardison Limestone, Joana Limestone, and Fitchville Formation of Utah; the Mission Canyon Limestone of Montana; the Monte Cristo Limestone, Eleana Formation, Joana Limestone, and Bristol Pass Limestone of Nevada; and the Tin Mountain Limestone of California. *Amplexus* has not been found in the Western Interior Province of Canada.

Genus ANKHELASMA Sando, 1961

Plate 1, figure 9

Diagnosis.—Small, solitary, ceratoid or trochoid rugose corals having a well-developed cardinal fossula on the convex side. Fossula bounded laterally by fused axial segments of cardinal lateral septa and axially by fused ends of counter and counter lateral septa. Septal plan in ephebic stage characterized by retreat of most major septa, leaving only five plates extending from corallum axis to calicular wall in ephebic calice: swollen counter septum, two plates formed by fusion of axial segments of cardinal lateral septa, and two plates formed by fusion of counter lateral septa. Minor septa present. Tabulae absent, open spaces in earlier part of corallum

filled with stereoplasm to floor of calice. Dissepiments absent.

Nominal species in Western Interior Province.—*A. typicum* Sando, 1961.

Discussion.—*Ankhelasma* is distinguished from *Sychnoelasma*, from which it was probably derived, by the presence of five septal plates in the ephelic stage.

Distribution.—Although somewhat rare, *Ankhelasma* has a relatively restricted stratigraphic range, being known only from Zone IIIA. The nominal species occurs in the Brazer Dolomite of Utah and the Castle Reef Dolomite of Montana. Similar forms have been found in the Mission Canyon Limestone of Wyoming, Idaho, and Montana; the Monte Cristo Limestone of Nevada; and in the Turner Valley and Debolt Formations of northeastern British Columbia. The genus occurs exclusively in the shallow-water shelf-carbonate lithofacies near the shelf margin.

Genus AULOSTYLUS Sando, 1976

Plate 1, figures 12, 13

Diagnosis.—Cerioid colonial rugose corals that have an aulos formed by union of deflected axial ends of major septa. Columella ordinarily present, a vertically discontinuous axial plate formed by prolongation of one or two major septa. Major and minor septa noncarinate or weakly carinate (zigzag type). Tabulae in aulos ordinarily horizontal, flat, commonly turned up at intersection with columella; tabulae in tabularium ordinarily concave upward, horizontal to slightly inclined toward periphery of corallite. Dissepimentarium lonsdaleoid.

Nominal species in Western Interior Province.—*A. tubiferus* (Hayasaka, 1936) and *A. bamberi* Sando, 1976.

Discussion.—*Aulostylus* is distinguished from *Stelechophyllum*, from which it was probably derived, by the presence of an aulos.

Distribution.—*Aulostylus* is a relatively rare coral that has a narrow stratigraphic range. It is confined to the lower half of Zone IIB. *Aulostylus tubiferus* occurs in the Lodgepole and Mission Canyon Limestones of Montana and in the Pekisko Formation of British Columbia. *A. bamberi* occurs in the Pekisko Formation of British Columbia. Undetermined species are also known from the Lodgepole Limestone and the Gardison Limestone of Utah. The genus occurs exclusively in shallow-water lithofacies.

Genus BARYTICHISMA Moore and Jeffords, 1945

Plate 2, figures 4, 5

Diagnosis.—Slightly curved, conico-cylindrical solitary rugose corals that have a thick theca. Major septa pin-

nately arranged and axially confluent in early stages but become radially arranged and amplexoid in mature stages. Tabulae generally flat but with downturned margins. Dissepiments absent.

Nominal species in Western Interior Province.—*B. amsdenense* (Branson and Greger, 1918).

Discussion.—*Barytichisma* is a descendent of *Amplexizaphrentis*. It is distinguished from *Amplexizaphrentis* by its thick theca and amplexoid septa in mature stages.

Distribution.—*Barytichisma* is a rare coral in the Mississippian of the Western Interior Province. Four of the five species known in North America are from beds of Pennsylvanian age outside the Western Interior Province (see discussion by Sando, 1975b). The nominal Mississippian species *B. amsdenense* occurs in the Amsden Formation of Wyoming. Undetermined species are known from the Surret Canyon Formation of Idaho and the Chainman Shale of Utah. The occurrences are in the upper part of Zone VB and the lower part of Zone VI. The genus occurs exclusively in shallow-water lithofacies. It has not been found in Canada.

Genus BEAUMONTIA Milne-Edwards and Haime, 1851

Plate 2, figure 3

Diagnosis.—Cerioid tabulate corals in which some of the corallites become fasciculate and have rounded cross sections. Tabulae convex, incomplete. Mural pores present. Septal spines may be present.

Nominal species in Western Interior Province.—None.

Discussion.—*Beaumontia* is distinguished from *Michelinia* by its partly phaceloid growth form. It probably was derived from *Michelinia*.

Distribution.—The genus is very rare in the Western Interior Province, where it is restricted to Zones IB and C, and IIA. Undetermined species occur in the Lodgepole Limestone of Utah and the Tin Mountain Limestone of California. The genus has not been found in Canada. Its ecologic occurrence is exclusively in the deep-water basinal-carbonate facies.

Genus CANADIPHYLLUM Sutherland, 1954

Plate 2, figures 1, 2

Diagnosis.—Small to large, solitary trochoid rugose corals in which the major septa of the cardinal quadrants are pinnate and generally almost at right angles to a prominent cardinal fossula. Septa of the counter quadrants radially arranged to subparallel with the cardinal-counter plane. Minor septa short or absent. Tabulae complete, slightly convex, with downturned edges. Dissepiments absent.

Nominal species in Western Interior Province.—*C. knoxi* Sutherland, 1954, and *C. californicum* (Tischler, 1956).

Discussion.—In addition to the nominal species, at least two undescribed species are useful for stratigraphic zonation. A large form having a widely flaring calice is very common in Zones IIIC and D.

Canadiphyllum seems to have been derived from *Amplexizaphrentis*. The flaring form has a primitive columella at some localities, suggesting that the genus may be the ancestor of *Ekvasophyllum*.

Distribution.—The total stratigraphic range of *Canadiphyllum* is from the upper part of Zone IIB (single occurrence) well into Zone IV, but it is abundant only in Zones IIIC and D. *C. knoxi* occurs in the Prophet Formation of British Columbia, and *C. californicus* occurs in the Perdido Formation of California. Undetermined species are known from the Mission Canyon Limestone of Wyoming; the Little Flat Formation, Aspen Range Formation, Great Blue Limestone, and Scott Peak Formation of Idaho; the Humbug Formation, Little Flat Formation, and Deseret Limestone of Utah; the Perdido Formation equivalent, Banner Formation, Monte Cristo Limestone, and Goughs Canyon Formation of Nevada; the Perdido Formation of California; the Turner Valley, Livingstone, and Mount Head Formations of Alberta; and the Debolt and Prophet Formations of northeastern British Columbia. The genus occurs in both shallow- and deep-water lithofacies but is most common in shallow-water habitats.

Genus CANINIA Michelin in Gervais, 1840

Plate 2, figures 8, 9

Diagnosis.—Trochoid to cylindrical solitary rugose corals. Major septa numerous, radially arranged, and amplexoid in later growth stages. Minor septa ordinarily short. Cardinal fossula well marked and on convex side of corallum, bounded axially by downturned edges of tabulae. Tabulae numerous, flat axially, and turned down at margins. Dissepimentarium variable in width, composed of regular or herringbone dissepiments.

Nominal species in Western Interior Province.—None.

Discussion.—Western Interior specimens assigned here are similar to corals identified as *Caninia* s.l. in most other parts of the world. This genus is the probable ancestor of *Siphonophyllia*.

Distribution.—*Caninia* has a sporadic occurrence beginning at the top of Zone IC and ranging to the top of Zone IIID. The genus is rare throughout its range. It occurs in the Lodgepole Limestone, Allan Mountain Limestone, Mission Canyon Limestone, and Charles Formation of Montana; Madison Limestone of Wyoming; Scott Peak Formation of Idaho; Brazer Dolomite of Utah;

Monte Cristo Limestone of Nevada; Redwall Limestone of Arizona; Tin Mountain Limestone of California; Flett Formation of southwestern District of Mackenzie; and Debolt Formation of northeastern British Columbia. It occurs almost exclusively in shallow-water lithofacies.

Genus CLEISTOPORA Nicholson, 1888

Plate 3, figure 5

Diagnosis.—Small, discoid, adherent tabulate corals having basal epitheca. Corallites short, prismatic, having dense walls pierced by numerous mural pores and lined with reticulate skeletal tissue. Tabulae rare, thin.

Nominal species in Western Interior Province.—*C. placenta* (White, 1880).

Discussion.—All specimens of this genus found in the Western Interior Province are referred to *C. placenta*, which was originally described from the Chouteau Limestone of Missouri. *C. placenta* is distinguished from other North American species by having a larger corallum and larger number of corallites (see discussion by Sando, 1960b, p. 182). The Mississippian species probably were derived from species that occurred in the Late Devonian.

Distribution.—*C. placenta* is a relatively rare coral that has a short stratigraphic range from the base of Zone IC into the lower part of Zone IIB. It occurs in the Lodgepole Limestone of Wyoming, Montana, and Utah; the Joana Limestone of Nevada; and the Banff Formation of Alberta. It is found in both deep-water and shallow-water lithofacies but is slightly more common in shallow-water habitats.

Genus CLISIOPHYLLUM Dana, 1846

Plate 3, figures 1, 2

Diagnosis.—Solitary, ceratoid or trochoid to cylindrical rugose corals. Axial structure wide, composed of short medial plate and septal lamellae about half as numerous as major septa and commonly twisted spirally. Major septa radially arranged and not curved about small fossula. Minor septa short. Tabular floors conical. Two series of tabellae; tabellae of periaxial series fewer and less steep than those of axial series. Dissepimentarium narrow, composed of numerous small concentric dissepiments.

Nominal species in Western Interior Province.—None.

Discussion.—This taxon includes corals previously referred to *Dibunophyllum* (see Sando, Mamet, and Dutro, 1969), from which it is distinguished by the nature of its axial structure.

Distribution.—*Clisiophyllum* is a rare coral restricted to Zone IV in the Western Interior Province. It occurs

in the Otter Formation of Montana; the Monroe Canyon Limestone, Aspen Range Formation, Great Blue Limestone, and Scott Peak Formation of Idaho; the Monroe Canyon Limestone, Humbug Formation, and Great Blue Limestone of Utah; and the Mount Head Formation of Alberta. It is found exclusively in the shallow-water shelf-carbonate lithofacies.

Genus *CYATHAXONIA* Michelin, 1847

Plate 3, figures 3, 4

Diagnosis.—Small, solitary ceratoid to cylindrical rugose corals. Minor septa long, contratingent, inserted alternately with metasepta according to metriophyllid septal plan. Columella tall, developed independently of major septa but in contact with them. Tabulae inclined downwards toward epitheca. Dissepiments absent. Sides of septa may have rows of tubercles steeply inclined downward from the horizontal toward the corallum axis.

Nominal species in Western Interior Province.—*C. tantilla* (Miller, 1891). *C. tantilla* includes junior synonyms *C. minor* Weller, 1909, and *C. cordillerensis* Easton, 1958.

Discussion.—Sando (1977d) amended the genus to include tuberculated forms referred to *Cyathocarinia* Soshkina, 1928, and discussed the distinguishing characters of the North American species. Although only one nominal species is known, other undescribed species probably are in collections from the Western Interior Province.

Distribution.—*Cyathaxonia* is abundant in Zones IB and C and rare in Zones IIA and B, IIIA–C; it may also be present in Zones IIID and IV. The nominal species is in the Lodgepole Limestone of Montana and Utah. Undetermined species occur in the Lodgepole Limestone of Wyoming; the Lodgepole Limestone, Mission Canyon Limestone, Allan Mountain Limestone, and Castle Reef Dolomite of Montana; the Mission Canyon Limestone of North Dakota; the Lodgepole Limestone, Mission Canyon Limestone, Middle Canyon Formation, and Scott Peak Formation of Idaho; the Lodgepole Limestone, Brazer Dolomite, Deseret Limestone, Joana Limestone, and Gardison Limestone of Utah; the Tin Mountain Limestone and Perdido Formation of California; the Red-wall Limestone of Arizona; the Monte Cristo Limestone, Joana Limestone, Diamond Peak Formation, Eleana Formation, and Goughs Canyon Formation of Nevada; the Banff Formation of Alberta and northeastern British Columbia; and the Turner Valley Formation of northeastern British Columbia. The genus is found predominantly in deep-water lithofacies.

Genus *DIPHYPHYLLUM* Lonsdale, 1845

Plate 3, figures 6, 7

Diagnosis.—Fasciculate colonial rugose corals. Septa short. Columella absent or impersistent. Tabulae flat or convex, with downturned edges. Dissepimentarium regular, composed of one or more rows of small dissepiments.

Nominal species in Western Interior Province.—None.

Discussion.—This genus is very similar to *Siphonodendron*, from which it differs by having flat or convex tabulae and by lacking a columella or having a thin, vertically discontinuous one. The genomorph concept of Smith and Lang (1930) was proposed to explain the relationship between *Diphyphyllum* and phaceloid *Lithostroton*; this concept and its attendant nomenclatural notation is no longer accepted (see Wilson, 1963). Although some workers have questioned the biologic validity of *Diphyphyllum* as a distinct genus, the concept is useful at least in recognizing distinct morphotypes. The name is used in this report in quotes to denote the uncertainty of its usage.

Distribution.—In the United States, *Diphyphyllum* is a common coral in Zone IIIA and is rare in Zone IIID. In Canada, it is common in the upper half of Zone IIB and the lower half of Zone IIIA, rare in the upper half of Zone IIIA and in Zone IIIB, and common again in Zones IIIC and D, and in the lower part of Zone IV. It occurs in the Madison Limestone and Mission Canyon Limestone of Wyoming; the Charles Formation and Mission Canyon Limestone of Montana; the Mission Canyon Limestone and Little Flat Formation of Idaho; the Monte Cristo Limestone of Nevada; the Deseret Limestone of Utah; the Charles Formation of Saskatchewan(?); the Shunda and Mount Head Formations of Alberta; the Turner Valley and Prophet Formations of northeastern British Columbia; and the Flett Formation of southwestern District of Mackenzie. It is found exclusively in the shallow-water carbonate lithofacies.

Genus *DORLODOTIA* Saleé, 1920

Plate 3, figures 8, 9

Diagnosis.—Fasciculate colonial rugose corals. Major septa short, ordinarily confined to tabularium. Minor septa ordinarily absent or consist of ridges on theca. Columella composed of a single axial plate that may be joined to one or more septa. Tabulae tent-shaped. Dissepimentarium composed of lonsdaleoid dissepiments.

Nominal species in Western Interior Province.—*D.?* *inconstans* (Easton and Gutschick, 1953).

Discussion.—Corals from the Western Interior Province are referred to *Dorlodotia* with a query because they have a weakly lonsdaleoid dissepimentarium and an impersistent columella.

Distribution.—The nominal species occurs in Zones IIIA and B in the Redwall Limestone of Arizona. Undescribed species are rare from the top of Zone IIB to the top of Zone IIID. The genus is represented in the Little Flat Formation of Idaho; the Banner Formation and Monte Cristo Limestone of Nevada; the Rundle Group of British Columbia; and the Turner Valley Formation of Alberta. It occurs exclusively in the shallow-water shelf-carbonate lithofacies.

Genus DUNCANOPORA Sando, 1975

Plate 4, figures 5, 6

Diagnosis.—Phaceloid and cerioid tabulate corals composed of cylindrical corallites joined at regular intervals in the corallum by lateral expansion or by connecting structures. Regular connections within the corallum may be by simple increase in diameter of corallites, which crowds the corallites together to produce polygonal cross sections, or by connecting tubules or encircling deposits of sclerenchyme perforated by pores connecting adjacent corallites. Tabulae sparse, ordinarily complete, horizontal, and slightly concave upward. Septal spines rare.

Nominal species in Western Interior Province.—*D. duncancae* Sando, 1975.

Discussion.—Corals belonging to this taxon were previously referred to *Tetraporinus?* (Dutro and Sando, 1963) and *Hayasakaia?* (Sando, Mamet, and Dutro, 1969). *Duncanopora* was probably derived from *Multithecopora?*

Distribution.—All specimens of this genus known from the Western Interior Province are referred to *D. duncancae*, which is confined to Zone VB. The species occurs in the Amsden Formation of Wyoming; the Monroe Canyon Limestone, Aspen Range Formation, and Surret Canyon Formation of Idaho; and the Green Ravine Formation of Utah. It has not been found in Canada. *Duncanopora* occurs exclusively in the shallow-water shelf-carbonate lithofacies.

Genus EKVASOPHYLLUM Parks, 1951

Plate 4, figures 3, 4

Diagnosis.—Medium sized, trochoid, solitary rugose corals having numerous septa tending toward radial

symmetry, except near prominent cardinal fossula on convex side of corallum, where they are pinnately arranged. Columella solid, slightly laterally compressed, rodlike. Tabulae incomplete, arched upwards to join columella. Dissepimentarium composed of small regular dissepiments.

Nominal species in Western Interior Province.—*E. banfense* (Warren, 1927); *E. cascadenense* (Warren, 1927); *E. enclinotabulatum* Sutherland, 1958; *E.?* *harkeri* Sutherland, 1958; *E. inclinatum* Parks, 1951. *E. cascadenense* includes the junior synonym *E. turbineum* Parks, 1951.

Discussion.—*Ekvasophyllum* is similar to *Lophophyllum?* but differs mainly in having a well-developed dissepimentarium and a thicker solid columella. *Ekvasophyllum* may have been derived from *Canadiphyllum* and is the ancestor of *Faberophyllum*.

Distribution.—*Ekvasophyllum* is a common coral in Zone IIID. In the United States, it is rare in Zone IIIC and in the lower half of Zone IV. In Canada, the genus ranges from the lower half of Zone IIIA into the upper half of Zone IV. It occurs in the Little Flat Formation, Monroe Canyon Limestone, Middle Canyon Formation, Aspen Range Formation, and Scott Peak Formation of Idaho; the Humbug Formation and Deseret Limestone of Utah; the Redwall Limestone of Arizona; the Banner Formation(?) and Chainman Formation(?) of Nevada; the Perdido Formation of California(?); the Mount Head and Livingstone Formations of Alberta; the Mount Head Formation and Milford Group of southeastern British Columbia; the Golata(?), Prophet, and Debolt Formations of northeastern British Columbia; and the Flett Formation of the southwestern District of Mackenzie. *Ekvasophyllum* occurs almost exclusively in the shallow-water shelf-carbonate facies.

Genus FABEROPHYLLUM Parks, 1951

Plate 4, figures 1, 2

Diagnosis.—Large trochoid to subcylindrical solitary rugose corals having numerous major septa tending toward radial symmetry, except near prominent closed cardinal fossula on convex side of corallum, where they are pinnately arranged. Minor septa long. Among species, axial structure ranges from a complex of one or more lamellae and tabellae to no axial structure and sagging tabulae. Tabulae incomplete, nearly horizontal, except for upturned edges at dissepimentarium. Dissepimentarium wide, composed of regular dissepiments.

Nominal species in Western Interior Province.—*F. araneosum* Parks, 1951; *F. languidum* Parks, 1951; *F.*

leathamense Parks, 1951; *F. minnewankensis* (Shimer, 1926); *F. occultum* Parks, 1951; *F. pisgahense* Parks, 1951; *F. stansburyi* (Hall, 1852). *F. stansburyi* includes the junior synonym *Zaphrentis? multilamellata* Hall, 1852.

Discussion.—In 1956, Hill (p. F290) regarded *Faberophyllum* as a junior synonym of *Turbophyllum* Parks, 1951, but later, she (1981, p. F374) considered the two genera as distinct. Although the two genera are very similar, we regard them as distinct. However, we have not referred any specimens other than the types to *Turbophyllum* and have not used this genus in the zonation because of its apparent rarity.

The nominal species of *Faberophyllum* are in need of restudy because they are based on fragmentary coralla that do not include the early growth stages. Study of abundant specimens in our collections might provide a satisfactory basis for revising nominal species.

Complete specimens of *Faberophyllum* have an early stage that has a solid styliform columella like that of *Ekvasophyllum* (see Sando, 1965, p. E21). This observation supports Parks' (1951) conclusion that *Ekvasophyllum* is the ancestor of *Faberophyllum*.

Distribution.—*Faberophyllum* is a very common coral in Zone IV; it is rare in the upper half of Zone IIID. The genus occurs in the Little Flat Formation, Monroe Canyon Limestone, Great Blue Limestone, and Scott Peak Formation of Idaho; the Monroe Canyon Limestone, Aspen Range Formation, Humbug Formation, and Great Blue Limestone of Utah; the Diamond Peak and Eleana Formations of Nevada; the Mount Head Formation of Alberta; and the Milford Group of southeastern British Columbia. It occurs almost exclusively in the shallow-water shelf-carbonate facies.

Genus GUERICHOPHYLLUM Rozkowska, 1969

Plate 2, figures 6, 7

Diagnosis.—Solitary trochoid to vermiform rugose corals. Major septa united at axis in early growth stages, withdrawn from axis in later stages. Cardinal fossula variable in position with respect to curvature of corallum, variably developed, bounded axially by downturned edges of tabulae. Minor septa short or absent. Tabulae ordinarily complete, flat axially, and turned down at margins. Dissepimentarium narrow, regular to lonsdaleoid.

Nominal species in Western Interior Province.—None.

Discussion.—Corals here referred to *Guerichophyllum* were previously identified as *Caninia* (*Caninia*), which does not have lonsdaleoid dissepiments. The occurrence of *Guerichophyllum* is mainly Devonian (Hill, 1981, p. F196), but Bartzsh and Weyer (1981) illustrated

specimens from the *Gattendorfia* Zone of Saalfeld in Thuringia. The Western Interior specimens are similar to those reported to Bartzsh and Weyer.

Guerichophyllum is similar to *Amplexus* but differs from the latter by having a zaphrentoid early stage and by having dissepiments.

Distribution.—*Guerichophyllum* is a common coral in Zones IB and C, IIA, and the lower part of IIB; it is rare in the upper part of Zone IIB. It is most common in the Lodgepole Limestone of Montana, Idaho, and Utah, and the Allan Mountain Limestone of Montana; it is rare in the Gardison and Deseret Limestones of Utah and in the Tin Mountain Limestone of California. It has not been found in Canada. Although it occurs in shallow-water lithofacies, it is most common to deep-water habitats.

Genus HAPSIPHYLLUM Simpson, 1900

Plate 5, figure 3

Diagnosis.—Small, curved, conical, solitary rugose corals having a prominent key-hole-shaped cardinal fossula ordinarily on the concave side of the corallum. Major septa pinnate. Minor septa contratingent. Tabulae present. Dissepiments absent.

Nominal species in Western Interior Province.—None.

Discussion.—Some authors have used this taxon in a broad sense to include simple Carboniferous corals formerly referred to *Zaphrentis*. Actually, the genus is distinguished by its contratingent minor septa, a rare feature in Carboniferous corals, and it is here used in a restricted sense for corals similar to *Amplexizaphrentis* but having contratingent minor septa. *Hapsiphyllum* was probably derived from *Amplexizaphrentis*.

Distribution.—*Hapsiphyllum* is a common coral in the Southeastern Province, where it occurs in the Warsaw and Salem Limestones. It is rare in the Western Interior Province, where it occurs mainly in Zone IIID; a single occurrence is known in Zone IIA. Undetermined species occur in the Allan Mountain Limestone of Montana, the Deseret Limestone of Utah, the Aspen Range Formation of Idaho, and an unknown formation in Nevada. The genus has not been found in Canada. It occurs exclusively in the shallow-water shelf-carbonate lithofacies.

Genus KONINCKOPHYLLUM Thomson and Nicholson, 1876

Plate 5, figures 1, 2

Diagnosis.—Solitary trochoid to cylindrical or dendroid colonial rugose corals. Columella small, compressed, styliform, commonly vertically discontinuous. Major septa thin, radial, do not extend to columella. Cardinal

fossula poorly defined. Minor septa long. Tabulae tent-shaped. Dissepimentarium wide, regular.

Nominal species in Western Interior Province.—None.

Distribution.—This genus is rare in the Western Interior Province. In Canada, its main occurrence is in the lower half of Zone IV, but sporadic occurrences are known in Zones IIB and IIIA. In the United States, forms referred questionably to the genus occur in Zone IIID. The occurrences are in the Deseret Limestone of Utah, an unknown formation in Nevada, the Prophet and Debolt Formations of northeastern British Columbia, and the Mount Head Formation of Alberta. The genus occurs in both deep-water and shallow-water lithofacies.

Genus LIARDIPHYLLUM Sutherland, 1954

Plate 5, figure 4

Diagnosis.—Small to medium-sized trochoid to cylindrical solitary rugose corals. Major septa amplexoid. Tabulae complete and incomplete, inclined downward axially to form a series of irregular inverted cones with cup-shaped depressions in axial region. Dissepimentarium lonsdaleoid.

Nominal species in Western Interior Province.—*L. hagei* Sutherland, 1954.

Distribution.—This very rare genus is known with certainty only from Zones IIIA and C in the Flett Formation of the southwestern District of Mackenzie. It has been identified questionably in Zone IIB in the Allan Mountain Limestone of Montana. It occurs in the shallow-water shelf-carbonate facies.

Genus LOPHOPHYLLUM Milne-Edwards and Haime, 1850

Plate 6, figure 4

Diagnosis.—Trochoid solitary rugose corals having a prominent cardinal fossala on convex side of corallum. Columella simple, styliiform. Major septa long, may or may not extend to columella, pinnate to radial. Minor septa short. Tabulae arched upward at axis. Dissepiments absent or sparse in mature stage only.

Nominal species in Western Interior Province.—*L. ? columnirotata* (Langenheim and Tischler, 1960); *L. eastoni* (Langenheim and Tischler, 1960); *L. panamintense* (Langenheim and Tischler, 1960); *L. ? proteus* (Sutherland, 1958); and *L. ? teres* (Girty, 1899).

Discussion.—This taxon includes corals formerly referred to *Rylstonia* (e.g., Sando, 1960b); they are here referred to *Lophophyllum* with a query because the type species of that genus is in need of further study before the genus can be identified with certainty. Some Soviet coral students (e.g., Sayutina, 1973) placed corals hav-

ing similar morphology in *Cyathoclisia*, but the type species of that genus has a well-developed dissepimentarium and a complex axial structure, whereas the corals from the Western Interior Province lack dissepiments or have a poorly developed dissepimentarium and a simple axial structure.

Undescribed specimens assigned to *Lophophyllum*? have not been studied in detail, and how many species are present in the Western Interior Province is not clear. Some of the nominal species may be synonyms. Forms that occur in the middle and upper parts of the stratigraphic range of the genus are characterized by a subdued columella. These forms may have given rise to *Zaphriphyllum* by reduction of the columella and addition of dissepiments.

Distribution.—In the United States, *Lophophyllum*? is rare in Zone IA, common from the base of Zone IB to about the middle of Zone IIB, and then rare again from about the middle of Zone IIB to the middle of Zone IIIA. It occurs in the Lodgepole Limestone, Mission Canyon Limestone, and Madison Limestone of Wyoming; the Allan Mountain Limestone, Mission Canyon Limestone, and Lodgepole Limestone of Montana; the Lodgepole and Mission Canyon Limestones of Idaho; the Lodgepole Limestone, Gardison Limestone, Joana Limestone, and Fitchville Formation of Utah; the Tin Mountain Limestone of California; the Redwall Limestone of Arizona; the Pahasapa Limestone of South Dakota; and the Joana Limestone, Mercury Limestone, Goughs Canyon Formation, and Monte Cristo Limestone of Nevada.

In Canada, the genus is common from the base to the top of Zone IIB and rare from the top of Zone IIB to the lower half of Zone IIID. It occurs in the Flett Formation of the southwestern District of Mackenzie; the Banff, Pekisko, Shunda, Prophet, and Debolt Formations of northeastern British Columbia; the Banff, Pekisko, Shunda, Turner Valley, Livingstone, and Mount Head Formations of Alberta; and the Mission Canyon Limestone of Saskatchewan.

Lophophyllum? occurs in both deep- and shallow-water lithofacies but is more common in the shallow-water habitats.

Genus METRIOPHYLLUM Milne-Edwards and Haime, 1850

Plate 6, figure 3

Diagnosis.—Small solitary trochoid or ceratoid rugose corals. Major septa extend to axis, where they form a simple columella. Minor septa absent or short, ordinarily contratingent when present. Cardinal fossula may be present at maturity. Sides of septa have horizontal or nearly horizontal flanges that have upturned outer edges. Tabulae very thin, steeply inclined from axis. Dissepiments absent.

Nominal species in Western Interior Province.—Specimens in the Western Interior Province may be conspecific with *M. deminutivum* Easton, 1944, which was described from the Chouteau Limestone of Missouri.

Discussion.—*Metriophyllum* is one of the few Devonian genera that extend into the Mississippian of North America. Specimens are so small that they are seldom collected except in etched silicified collections, so that the genus may be more common than is indicated by the number of existing specimens and localities.

Distribution.—This rare genus is restricted to Zone IB in the United States. It has not been found in Canada. It occurs in the Allan Mountain Limestone of Montana and the Lodgepole Limestone of Montana, Idaho, and Utah. The genus is found exclusively in the deep-water basinal-carbonate facies.

Genus MICHELINIA de Koninck, 1841

Plate 7, figures 6, 7

Diagnosis.—Cerioid tabulate corals of variable corallum shape. Walls pierced by mural pores. Septal spines or ridges present. Tabulae numerous, incomplete, convex.

Nominal species in Western Interior Province.—*M. expansa* White, 1880.

Discussion.—*Michelinia* is one of the few Devonian genera that range into the Mississippian of western North America. Existing collections have not been studied in detail in order to determine how many species are present in the Western Interior Province. In addition to the nominal species, there is a species similar to *M. meekana* Girty, 1910, in Zone V.

Distribution.—*Michelinia* has a long stratigraphic range beginning at the base of Zone IB and extending to the top of Zone VB, but the occurrences are sporadic. The nominal species is most common from the base of Zone II to about the middle of Zone II. *Michelinia* occurs in the Lodgepole and Mission Canyon Limestones of Wyoming; the Lodgepole Limestone, Mission Canyon Limestone, Allan Mountain Limestone, Castle Reef Dolomite, and Big Snowy Formation of Montana; the Lodgepole Limestone, Surret Canyon Formation, Scott Peak Formation, and South Creek Formation of Idaho; the Lodgepole Limestone, Gardison Limestone, Deseret Limestone, and Doughnut Formation of Utah; the Tin Mountain Limestone and Perdido Formation(?) of California; the Redwall Limestone of Arizona; the Diamond Peak Formation, Joana Limestone, Goughs Canyon Formation, and Monte Cristo Limestone of Nevada; the Mission Canyon Limestone of Saskatchewan; the Banff, Pekisko, and Shunda Formations of Alberta; the Etherington Formation of southeastern British Colum-

bia; and the Banff, Pekisko, Shunda, and Debolt Formations of northeastern British Columbia. *Michelinia* occurs predominantly in the shallow-water shelf-carbonate lithofacies.

Genus MULTITHECOPORA Yoh, 1927

Plate 7, figures 1, 2

Diagnosis.—Fasciculate tabulate corals. Corallite walls variable in thickness, commonly composed of concentric layers of sclerenchyme that reduce visceral cavity to a third to a fifth of the corallite diameter. Connecting tubes very thin and sparse or absent. Tabulae thin, sparse, complete, concave upward. Septal spines absent or sparse.

Nominal species in Western Interior Province.—*M. amsdenensis* Sando, 1975b.

Discussion.—Specimens from the Western Interior Province have walls that are not as thick as those of the type species, and connecting tubes are moderately abundant in these corals. Probably more than one species is present in the Western Interior Province, but the specimens collected have not been thoroughly studied. This genus was probably derived from *Syringopora* and gave rise to *Duncanopora*. *Multithecopora* differs from *Syringopora* by having sparse, nearly flat tabulae and thicker walls.

Distribution.—*Multithecopora* is rare in Zones IIID, IV, and VA and B. Most occurrences are in Zone VB, where the genus is represented by the nominal species. The genus is known from the Amsden Formation of Wyoming; the Big Snowy Formation of Montana; the Monroe Canyon Limestone and the Surret Canyon, Aspen Range, and Scott Peak Formations of Idaho; the Deseret Limestone, Chainman Shale, and the Green Ravine and Doughnut Formations of Utah; and the Banner Formation of Nevada. It has not been found in Canada. The genus occurs exclusively in the shallow-water shelf-carbonate lithofacies.

Genus NEAXON Kullmann, 1965

Plate 7, figure 8

Diagnosis.—Small, trochoid solitary rugose corals. Major septa radially arranged and ordinarily rhopaloid, joined axially to form an aulos. Minor septa contrasting or free, longer in counter quadrants. Outer tabulae slope up from epitheca. Inner tabulae horizontal where present. Dissepiments absent.

Nominal species in Western Interior Province.—None.

Discussion.—Corals previously identified as *Permia* Stuckenberg, 1895 (as interpreted by Hudson, 1943),

from the Western Interior Province are here referred to *Neaxon*. According to J. Fedorowski (oral commun., 1973) and N. V. Kabakovich (oral commun., 1975), who have examined Stuckenbergs types of *Permia*, the types are early stages of *Aulophyllum*. Although the Western Interior corals seem to belong to *Neaxon*, the name is used with a query because of the lack of detailed study of these North American specimens.

Distribution.—*Neaxon*? is a rare coral in the Western Interior Province, ranging sporadically from the base of Zone IB into the lower part of Zone IIIA. It is represented by undetermined species in the Lodgepole Limestone of Wyoming; the Allan Mountain and Lodgepole Limestones of Montana; the Lodgepole and Joana Limestones of Utah; the Goughs Canyon Formation of Nevada; and the Perdido Formation of California. It occurs almost exclusively in the deep-water basinal-carbonate facies.

Genus PALAEACIS Haime in Milne-Edwards, 1857

Plate 7, figures 3-5

Diagnosis.—Small wedge-shaped or conical tabulate corals, adherent in young stages, having few corallites. Thecae very thick, spongy, traversed by numerous anastomosing canals that open on the surface of the corallum (between the cups) and inside the cups via scattered or oriented pores. Septa absent or represented by longitudinal carinae. Tabulae absent.

Nominal species in Western Interior Province.—*P. cuneiformis* Milne-Edwards, 1860, *P. elongata* McGugan, 1983. *P. cuneiformis* includes the junior synonym *Sphenopoterium cuneatum* Meek and Worthen, 1860.

Discussion.—Although this genus does not have tabulae, it is referred to the Order Tabulata because its other morphological features are similar to those of other tabulates.

Distribution.—*Palaeacis* is a rare coral in the Western Interior Province and has a sporadic range from the base of Zone IB into the lower part of Zone VB in the United States. An undescribed new species is restricted to Zone IB. The nominal species, *P. cuneiformis*, has been found in Zones IIIA and D. Undetermined species occur in Zones IIB and VB.

P. elongata, recently found in Zone IV or the lower part of Zone V, is the only representative known from Canada.

The genus occurs in the Lodgepole Limestone, Castle Reef Dolomite, and Big Snowy Formation of Montana; the Lodgepole Limestone, Little Flat Formation, and Scott Peak Formation of Idaho; the Lodgepole Limestone and Deseret Limestone of Utah; the "Trinity Limestone"

of Nevada; and at an undetermined level (talus specimen) in the upper part of the Mount Head Formation or lower part of the Etherington Formation in Alberta. It occurs in both deep-water and shallow-water carbonate lithofacies.

Genus PETALAXIS Milne-Edwards and Haime, 1852

Plate 7, figures 9, 10

Diagnosis.—Cerioid colonial rugose corals having tabular to hemispherical corallum shape. Major septa thin, ordinarily extending into tabularium but seldom reaching columella, and ordinarily discontinuous or absent in dissepimentarium, but species with only weakly lonsdaleoid dissepimentarium are known. Minor septa absent to well developed. Columella ordinarily a simple axial plate joined to counter and/or cardinal septum but composed of axial plates, impersistent vertical axial tabellae, and a few axial lamellae in some species. Tabulae complete and incomplete, essentially horizontal, flat, concave, or convex, turned up at columella in some species. Peripheral clinotabellae may be present. Dissepimentarium ordinarily lonsdaleoid but may be mostly regular in some species.

Nominal species in Western Interior Province.—*P. bailliei* (Nelson, 1960); *P. simplex* (Hayasaka, 1936); *P. tabulatus* (Hayasaka, 1936); *P. wyomingensis* Sando(?).

Discussion.—Sando (1983) recently revised the genus to include the first three nominal species listed above from the Mississippian of the Western Interior Province. *P. wyomingensis* Sando, another nominal species, occurs in beds of uncertain age and identity that may belong to the Mississippian. The genus ranges from Late Mississippian to Permian, but Pennsylvanian and Permian species do not occur in the Western Interior Province. *Petalaxis* was probably derived from *Acrocyathus* in the Late Mississippian.

Distribution.—*Petalaxis* is a rare coral in the Mississippian of the Western Interior Province. Its principal occurrence is in Zones IIID and IV, but it may also be present in Zone V or Zone VI, on the basis of a single occurrence of uncertain stratigraphic position. It occurs in the Scott Peak and Aspen Range Formations of Idaho; the Monroe Canyon Limestone equivalent of Utah; an unknown formation in Wyoming; and the Mount Head Formation of Alberta. It occurs exclusively in the shallow-water shelf-carbonate lithofacies.

Genus PLEUROSIPHONELLA Chudinova, 1970

Plate 8, figures 7, 8

Diagnosis.—Fasciculate tabulate corals composed of relatively thick walled, cylindrical corallites joined at

irregular intervals and connected by mural pores or very short tubules. Corallites commonly joined to form short chains or clusters at some levels in the corallum. Tabulae mostly vesicular, ordinarily vertically disposed along one side of corallite wall in such a way as to leave a visceral canal along the other side, or tabulae may be infundibular, having the axis of the funnels closer to one side of the corallite than the other. Septal spines rare or absent in some species, present in others. Wall structure fibrous. Increase lateral, commonly multiple.

Nominal species in Western Interior Province.—*P. drummondi* (Nelson, 1962); *P. magnussoni* (Nelson, 1962); *P. virginica* (Butts, 1941).

Discussion.—This genus is differentiated from *Syringopora*, from which it was probably derived, by its ex-centric tabulae, thick fibrous walls, and corallites seldom joined by connecting tubules. We regard *Oharaia* Nelson, 1977, as a junior synonym of *Pleurosiphonella*.

Distribution.—An undetermined species of *Pleurosiphonella* occurs in Zones IIB and IIIA in the United States; *P. virginica* is common in Zones IIID and IV, and *P. drummondi* is rare in Zones VB and VI. In Canada, *P. virginica* and *P. magnussoni* range from near the base of Zone IIIA into Zone V, and *P. drummondi* is found in the lower part of Zone VI.

The genus occurs in the Mission Canyon Limestone and Amsden Formation of Wyoming; the Castle Reef Dolomite, Charles Formation, and Mission Canyon Limestone of Montana; the Monroe Canyon Limestone, Great Blue Limestone, Aspen Range Formation, Scott Peak Formation, and Surret Canyon Formation of Idaho; the Little Flat Formation, Monroe Canyon Limestone, Deseret Limestone, Humbug Formation, and Great Blue Limestone of Utah; an unnamed formation in Nevada; and the Mount Head, Livingstone, and Etherington Formations of Alberta and British Columbia.

Pleurosiphonella occurs exclusively in the shallow-water shelf-carbonate lithofacies.

Genus PSEUDODORLODOTIA Minato, 1955

Plate 8, figures 3, 4

Diagnosis.—Phaceloid colonial rugose corals. Major septa do not reach axis. Minor septa short. Cardinal fossula may be present. Columella weak, impersistent, or absent, consisting of a simple axial plate commonly connected to counter septum. Tabulae flat, with downturned edges. Dissepimentarium lonsdaleoid.

Nominal species in Western Interior Province.—None.

Discussion.—Just as *Diphyphyllum* may be a non-columellate variant of *Siphonodendron*, so

Pseudodorlodotia may be a noncolumellate variant of *Dorlodotia*. However, corals identified as "*Pseudodorlodotia*" from the Western Interior Province may actually represent a noncolumellate variant of phaceloid species of *Acrocyathus*; the ranges of these two taxa are almost identical. These corals also differ from the type species of *Dorlodotia* and *Pseudodorlodotia* by having an only weakly lonsdaleoid dissepimentarium. The name is used in quotes for Western Interior Province corals because of these taxonomic uncertainties.

Distribution.—"*Pseudodorlodotia*" is a rare coral in the Western Interior Province. Its principal range in the United States is from about the middle of Zone IIID to the top of Zone IV; a questionable occurrence is in the upper half of Zone VA. In Canada, the genus ranges nearly through the upper half of Zone IV.

"*Pseudodorlodotia*" occurs in the Monroe Canyon Limestone, Scott Peak Formation, Aspen Range Formation, and possibly the Surret Canyon Formation of Idaho; the Deseret Limestone of Utah; the Mount Head Formation of Alberta; and the Milford Group of southeastern British Columbia. The genus occurs exclusively in the shallow-water shelf-carbonate lithofacies.

Genus RHOPALOLASMA Hudson, 1936

Plate 8, figure 5

Diagnosis.—Small, curved, trochoid solitary rugose corals having rhopaloid septa and tachylasmoid septal development. Major septa approximately straight, bilaterally symmetrical. Cardinal septum on convex side of corallum. Cardinal and counter septa short. Alar septa and KL1 strongly rhopaloid. KL4, KL5, CL3, CL4 may be strongly rhopaloid. KL2, KL3, CL2, CL3 not fully developed. Minor septa short. Tabulae conical, incomplete. Dissepiments absent.

Nominal species in Western Interior Province.—None.

Discussion.—This genus is commonly regarded as a junior synonym of *Ufimia*, a Late Carboniferous and Permian form. We regard *Ufimia* as a homeomorph of *Rhopalolasma* and retain the latter name for Early Carboniferous forms.

Distribution.—*Rhopalolasma* is represented by questionable occurrences in Zone IIB and is rare from the base of Zone IIIA to the top of Zone IIID. It occurs in the Deep Creek Formation of Idaho; the Deseret Limestone, Little Flat Formation, and Humbug Formation of Utah; and the Chainman Formation, Goughs Canyon Formation, and "Trinity Limestone" of Nevada. The genus has not been found in Canada. It occurs almost exclusively in the deep-water basinal-carbonate lithofacies.

Genus ROTIPHYLLUM Hudson, 1942

Plate 8, figure 6

Diagnosis.—Small ceratoid solitary rugose corals having a cardinal fossula on the convex side of the corallum. Major septa radially arranged, peripherally dilated, and rhopaloid axially, where they are joined by stereoplasm to form a columella. Counter septum may be longer than other septa. Minor septa long, contratingent. Tabulae incomplete, conical. Dissepiments absent.

Nominal species in Western Interior Province.—None. Sando (1960b, p. 171) referred some corals from Montana questionably to *R. hians* Easton, a Mississippi Valley species.

Distribution.—*Rotiphyllum* is a rare coral having a long stratigraphic range from the base of Zone IC to the top of Zone VA in the United States. It occurs in the Madison Limestone of Wyoming; the Lodgepole, Mission Canyon, and Allan Mountain Limestones of Montana; the Aspen Range, Deep Creek, Middle Canyon, Scott Peak, South Creek, and McGowan Creek Formations of Idaho; the Little Flat Formation, Lodgepole Limestone, Deseret Limestone, Humbug Formation, Gardison Limestone, and Great Blue Limestone of Utah; and in an undetermined formation in Nevada. The genus is very rare in Zone IIIB in Canada. It occurs in both deep-water and shallow-water lithofacies but is more common in deep-water habitats.

Genus SCHOENOPHYLLUM Simpson, 1900

Plate 8, figures 1, 2

Diagnosis.—Phaceloid colonial rugose corals having slender connecting tubules. Major septa few, mostly not reaching axis. Minor septa short or absent. Columella solid, compressed, styliform, formed by prolongation of counter septum. Tabulae complete, almost flat. Dissepimentarium consists of a single row of impersistent dissepiments.

Nominal species in Western Interior Province.—*S. aggregatum* Simpson, 1900. *S. aggregatum* includes the junior synonym *Lithostrotion* [*Siphonodendron*] *genevievensis* Easton, 1957.

Discussion.—*Schoenophyllum* is similar to *Siphonodendron*, from which it was probably derived, but it differs in having a strong counter septum prolonged to form the columella, connecting processes, and nearly flat tabulae. Easton (1957) concluded that the type species belongs in *Siphonodendron* and proposed the name *genevievensis* to replace Simpson's (1900) *aggregatum* because of the prior existence of *Siphonodendron aggregatum* McCoy. We now return to Simpson's name because we regard *Schoenophyllum* as distinct

from *Siphonodendron*. *Schoenophyllum aggregatum* is common in the Ste. Genevieve Limestone and its equivalents of Kentucky, Indiana, and Tennessee, where it was called *Lithostrotion harmodites* by earlier authors.

Distribution.—*Schoenophyllum* is a rare coral having a limited stratigraphic range in the Western Interior Province, where it is confined to Zone VA. It occurs in the Great Blue Limestone and Scott Peak Formation of Idaho and in the Etherington Formation of Alberta and southeastern British Columbia. The genus occurs exclusively in the shallow-water shelf-carbonate lithofacies.

Genus SCIOPHYLLUM Harker and McLaren, 1950

Plate 9, figures 3, 4

Diagnosis.—Ceratoid colonial rugose corals. Septa absent or reduced to fine vertical striae on inner side of theca or inside inner wall, rarely both in one corallite. Columella absent. Tabulae complete, flat, or slightly arched. Dissepimentarium consists of one or two rows of lonsdaleoid dissepiments.

Nominal species in Western Interior Province.—*S. adjunctivum* (White, 1880).

Discussion.—This genus is similar to "*Thysanophyllum*" but differs in its complete reduction of the septa and lack of even a vestige of a columella. It was probably derived from *Acrocyathus* in the Late Mississippian.

Distribution.—*Sciophyllum* is rare in the upper part of Zone IIID and the lower part of Zone IV. It has been found in the Scott Peak Formation and Monroe Canyon Limestone of Idaho, in an unnamed formation in Nevada, and in the Mount Head Formation of Alberta. It occurs exclusively in the shallow-water shelf-limestone lithofacies.

Genus SIPHONODENDRON McCoy, 1849

Plate 5, figures 5–8; plate 6, figures 1, 2, 5–8

Diagnosis.—Phaceloid colonial rugose corals. Columella simple, styliform. Major septa ordinarily long, may or may not extend to columella. Minor septa short. Tabulae large, conical, ordinarily supplemented by outer smaller and nearly horizontal tabulae. Dissepimentarium regular, continuous and wide in large species but may be narrow and discontinuous in small species.

Nominal species in Western Interior Province.—*S. mutabile* (Kelly, 1942); *S. oculinum* (Sando, 1963); *S. sinuosum* (Kelly, 1942); *S. warreni* (Nelson, 1960); *S. whitneyi* of Meek, 1877 (not White, 1875).

Discussion.—Similarities between *Siphonodendron*

and "*Diphyphyllum*" have been discussed under the latter. The nominal species are well defined, and their distribution in Canada is well known. Specimens from the United States have not been so thoroughly studied as the material from Canada. The problem of *S. whitneyi* of Meek has been discussed by Sando (1965, p. E17-E18); a new name is needed for this species.

Distribution.—In Canada, *Siphonodendron* has a discontinuous range from the base of Zone IIB into the lower half of Zone V. It is represented by *S. mutabile* in Zone IIB, *S. oculinum* in Zones IIIA and B, and *S. whitneyi* of Meek in Zone IIID. *S. sinuosum* ranges from Zone IIB to Zone IIIC, and *S. warreni* ranges from Zone IIID into lowermost Zone IV. The genus occurs in the Banff, Livingstone, Shunda, Turner Valley, Mount Head, and Etherington Formations of Alberta; the Debolt, Prophet, Turner Valley, Mount Head, and Etherington Formations and the Milford and Rundle Groups of British Columbia; and the Flett Formation of the southwestern District of Mackenzie.

In the United States, the genus has a more restricted stratigraphic range, and fewer species are recognized. Many specimens have not been identified specifically. *S. oculinum* is very rare at the top of Zone IIB and is common in Zone IIIA. *S. whitneyi* of Meek is common in Zone IIID and rare in Zone IV. The genus occurs in the Mission Canyon Limestone of Wyoming; the Mission Canyon Limestone and Castle Reef Dolomite of Montana; the Mission Canyon Limestone, and the Little Flat, Aspen Range, and Scott Peak Formations of Idaho; the Brazer Dolomite, Deseret Limestone, Humbug Formation, and Great Blue Limestone of Utah; the Leadville Limestone of Colorado; the Redwall Limestone of Arizona; the Banner Formation, Diamond Peak Formation, Goughs Canyon Formation, and Monte Cristo Limestone of Nevada; and, possibly, the Perdido Formation of California. The genus occurs exclusively in the shallow-water shelf-carbonate lithofacies.

Genus SIPHONOPHYLLIA Scouler in McCoy, 1844

Plate 2, figures 10-11

Diagnosis.—Large trochoid to cylindrical solitary rugose corals. Major septa numerous, amplexoid in later growth stages. Minor septa short. Cardinal fossula well marked and on convex side of corallum, bounded axially by downturned edges of tabulae. Tabulae numerous, ordinarily complete, flat axially, and turned down at margins. Dissepimentarium broad, ordinarily lonsdaleoid.

Nominal species in Western Interior Province.—*Siphonophyllia enormis* (Easton, 1945); *S. excentrica* (Meek, 1873); *S. montanensis* (Easton, 1962); *S. nevadensis* (Meek, 1877).

Discussion.—Corals of this group in the Western Interior Province were previously identified as *Caninia* (*Siphonophyllia*?) because they have a dissepimentarium that is weakly lonsdaleoid. They differ from typical *Siphonophyllia* by having lonsdaleoid dissepiments in a medial zone between inner and outer zones of regular dissepiments. Among the nominal species, *S. nevadensis*, a cylindrical form, and *S. excentrica*, a conical form, may be different growth forms of the same species (see Sando, 1965, p. E24; 1975b, p. C19). *S. enormis* may be conspecific with *S. excentrica*. *Siphonophyllia* was probably derived from *Caninia*.

Distribution.—*Siphonophyllia* is abundant in and characteristic of Zone V and has been found recently near the top of Zone VI at two localities in southwest Montana in the Big Snowy Formation (B. R. Wardlaw, oral commun., 1982). This genus is known from the Amsden Formation of Wyoming; the Big Snowy, Otter, and Heath Formations of Montana; the Monroe Canyon Limestone, the Surret Canyon, Scott Peak, and Aspen Range Formations, and Great Blue Limestone of Idaho; the Green Ravine Formation, Great Blue Limestone, and Doughnut Formation of Utah; and the Etherington Formation of Alberta. The genus occurs almost exclusively in shallow-water lithofacies.

Genus STELECHOPHYLLUM Tolmachev, 1933

Plate 9, figures 6-11

Diagnosis.—Cerioid colonial rugose corals. Major septa thin, ordinarily extending across tabularium to columella but discontinuous or absent in dissepimentarium. Minor septa absent to variably developed. Columella ordinarily a simple axial rod or plate that may be derived from one or more major septa. Tabularium consisting of an axial series of bell-shaped to tent-shaped complete tabulae resting one upon the other and a weak peripheral series of horizontal or inclined concave-upward tabellae. Dissepimentarium lonsdaleoid.

Nominal species in Western Interior Province.—*S. banffense* (Warren, 1927); *S. ? birdi* Armstrong, 1970; *S. circinatum* (Easton and Gutschick, 1953); *S. lochmanae* (Armstrong, 1962); *S. ? macouni* (Lambe, 1899); *S. ? mclareni* (Sutherland, 1958); *S. microstylum* (White, 1880); *S. micrum* (Kelly, 1942).

S. microstylum includes junior synonyms *Lithostrotionella jasperensis* Kelly, 1942; *L. confluens* Easton, 1958; and *L. multiradiata* Hayasaka, 1936. *S. banffense* includes junior synonyms *Lithostrotionella floriformis* Hayasaka, 1936, and *L. vesicularis* Hayasaka, 1936.

Discussion.—This genus includes some of the corals previously referred to *Lithostrotionella* Yabe and Hayasaka, 1915. The taxonomy and world distribution

of *Stelechophyllum* have been discussed by Sando (1983). *Stelechophyllum* is the probable ancestor of *Acrocyathus* and *Aulostylus*.

Distribution.—The principal occurrence of *Stelechophyllum* in the Western Interior Province of the United States is in the lower half of Zone II. *S. microstylum*, a Mississippi Valley species, occurs in the Lodgepole Limestone of Wyoming; the Lodgepole and Mission Canyon Limestones of Montana; the Lodgepole, Gardison, and Joana Limestones of Utah; the Lodgepole and Mission Canyon Limestones of Idaho; and the Joana and Monte Cristo Limestones of Nevada. *S. circinatum* is found at a slightly higher level in the upper half of Zone II in the Redwall Limestone of Arizona. Undetermined species of *Stelechophyllum* are rare in Zone IIIA in the Castle Reef Dolomite of Montana and in Zone IIID in the Little Flat Formation of Idaho.

In Canada, the genus occurs in the same zones as it does in the United States. *S. microstylum* is found in the uppermost part of the Banff Formation and the lowermost part of the Pekisko Formation of Alberta and northeastern British Columbia. *S. micrum* is slightly higher, in the upper part of the Pekisko Formation and lower part of the Shunda Formation of Alberta and the lower part of the Mission Canyon Limestone of Saskatchewan. *S. lochmanae* occurs in the Pekisko Formation of Alberta. *S. banffense* is found in the Mount Head Formation of Alberta and the Prophet and Debolt Formations of northeastern British Columbia. *S. ? macouni* is in the Prophet Formation of British Columbia and the Mount Head Formation of Alberta. *S. ? mclareni* occurs in the Flett Formation of southwestern District of Mackenzie, the Prophet and Debolt Formations of northeastern British Columbia, the Mount Head Formation of Alberta, and the Milford Group of southeastern British Columbia. *S. ? birdi* is found in the Prophet Formation of northeastern British Columbia. Unnamed species occur in the Flett Formation of southwestern District of Mackenzie and in the Prophet, Pekisko, and Debolt Formations of northeastern British Columbia.

Stelechophyllum occurs exclusively in shallow-water carbonate lithofacies. Its principal occurrence is in the shallow-water basinal-carbonate facies.

Genus SYCHNOELASMA Lang, Smith, and Thomas, 1940

Plate 9, figure 5

Diagnosis.—Ceratoid to trochoid, slightly curved solitary rugose corals having a slit-shaped cardinal fossula on the convex side of the corallum. Major septa long, radially arranged, axial ends fused to form axial stereozone. Minor septa long, peripheral ends fused with major septa to form peripheral stereozone. Tabulae upwardly arched. Dissepiments absent.

Nominal species in Western Interior Province.—*S. subcrassum* (Easton and Gutschick, 1953), *S. ulrichanum* (Girty, 1903). *Triplophyllites* (*Homalophyllites*) *circularis* Easton, 1958, may be a junior synonym of *S. subcrassum*. *S. ulrichanum* includes the junior synonym *Triplophyllites* (*Homalophyllites*) *paucicinctus* Easton and Gutschick, 1953.

Discussion.—*Sychnoelasma* includes corals previously referred to *Homalophyllites* Easton, 1944 (e.g., Sando, 1960b, 1969). We agree with Sayutina's (1976) placement of *Homalophyllites* as a junior synonym of *Sychnoelasma*. We do not agree with Sayutina's (1976) conclusion that *Menophyllum* Milne-Edwards and Haime, 1850, is identical with *Sychnoelasma*. *Sychnoelasma* is a probable derivative of *Amplexizaphrentis* and is regarded as the ancestor of *Ankhelesma*.

Sychnoelasma is one of the most common corals in the Mississippian of the Western Interior Province. Species in addition to the nominal species may be present, because large collections of this genus have not been studied in detail.

Distribution.—In the United States, the principal range of the genus is from the base to the top of Zone II, but it is rare in Zone IC and in the lowermost part of Zone IIIA. The nominal species are in the Redwall Limestone of Arizona and the Leadville Limestone of Colorado. Undetermined species occur in the Madison, Mission Canyon, and Lodgepole Limestones of Wyoming; the Lodgepole Limestone, Mission Canyon Limestone, Allan Mountain Limestone, and Castle Reef Dolomite of Montana; the Lodgepole and Mission Canyon Limestones of Idaho; the Lodgepole Limestone, Brazer Dolomite, Gardison Limestone, and Joana Limestone of Utah; the Monte Cristo and Joana Limestones of Nevada; and the Tin Mountain Limestone of California.

In Canada, *Sychnoelasma* is common from the base to near the top of Zone II and is rare in uppermost Zone II and lowermost Zone IIIA. It occurs in the Lodgepole and Mission Canyon Limestones of Saskatchewan; the Banff, Pekisko, Shunda, and Livingstone Formations of Alberta; and the Banff, Pekisko, and Shunda Formations of northeastern British Columbia.

Sychnoelasma is found in both shallow-water and deep-water lithofacies, but its predominant occurrence is in shallow-water habitats.

Genus SYRINGOPORA Goldfuss, 1826

Plate 9, figures 1, 2

Diagnosis.—Phaceloid tabulate corals having axial infundibular tabulae, randomly arranged connecting tubes, and septal spines.

Nominal species in Western Interior Province.—Recognition of nominal species in *Syringopora* depends on a choice between different systems of classification (see discussion below). For the present, no nominal species are recognized because of the difficulty in using existing species concepts in zonation.

Discussion.—Studies by Sando (1960b, 1969) of *Syringopora* in the United States resulted in recognition of four "species" in the Madison Group of Montana and three "species" in the Redwall Limestone of Arizona. These "species" are intergrading morphogroups that have no apparent value in zonation because each morphogroup has about the same stratigraphic range.

In Canada, Nelson (1962a) recognized nine species and two formae in the Mississippian of Alberta. Nelson (1977) revised his earlier work and proposed a system that lumped the Canadian representatives of *Syringopora* in two species and recognized four subspecies that he thought had stratigraphic significance. Nelson's taxa are based on rather subtle morphologic distinctions of questionable biologic and stratigraphic significance. Inasmuch as we have not had time to test Nelson's concepts, we have not accepted his system of classification.

Syringopora is similar to *Pleurosiphonella* and *Multithecopora*; differences between *Syringopora* and these taxa are discussed under the other taxa.

Distribution.—*Syringopora* is one of the most common corals in the Mississippian of the Western Interior Province. It occurs in both deep-water and shallow-water lithofacies but is much more common in shallow-water habitats. *Syringopora* is one of the few genera that range from the Devonian into the Mississippian.

In the United States, Mississippian occurrences of the genus range from the base of Zone IA to the top of Zone IV, but the genus is most common from the base of Zone IB to the top of Zone IIIA. It occurs in the Madison, Lodgepole, Mission Canyon, and Pahasapa Limestones of Wyoming; the Allan Mountain Limestone, Castle Reef Dolomite, Lodgepole Limestone, Charles Formation, and Mission Canyon Limestone of Montana; the Lodgepole Limestone, Mission Canyon Limestone, Little Flat Formation, and Scott Peak Formation of Idaho; the Pahasapa Limestone of South Dakota; the Mission Canyon Limestone of North Dakota; the Leadville Limestone of Colorado; the Lodgepole Limestone, Brazer Dolomite, Gardison Limestone, Deseret Limestone, Humbug Formation, Joana Limestone, and Fitchville Formation of Utah; the Redwall Limestone of Arizona; the Monte Cristo Limestone, Joana Limestone, Mercury Limestone, Goughs Canyon Formation, and Bristol Pass Limestone of Nevada; and the Tin Mountain Limestone of California.

In Canada, Mississippian *Syringopora* ranges from the upper part of Zone I to the top of Zone IV and is most

common in Zone IIB. The genus occurs in the Banff, Pekisko, Shunda, Turner Valley, and Mount Head Formations of Alberta; the Banff Formation, Rundle Group, and Milford Group of British Columbia; and the Lodgepole and Mission Canyon Limestones of Saskatchewan.

Genus *THYSANOPHYLLUM* Nicholson and Thomson, 1876

Plate 10, figures 1, 2

Diagnosis.—Cerioid colonial rugose corals. Major septa do not extend to axis of corallum. Minor septa may be present. Columella absent or poorly developed and impersistent, may be attached to counter septum. Tabulae complete, ordinarily flat or sagging, having downturned edges. Dissepimentarium lonsdaleoid.

Nominal species in Western Interior Province.—"T." *astreiforme* (Warren, 1927).

Discussion.—Corals included in this taxon may be non-columellate variants of *Stelechophyllum* or *Acrocyathus*. The name "*Thysanophyllum*" is used in quotes to denote taxonomic uncertainty.

Distribution.—"Thysanophyllum" is a rare coral in the Western Interior Province. In Canada, the nominal species is found in the upper part of Zone IIID and in Zone IV; an undetermined species occurs in Zone IIIA. The nominal species is in the Mount Head Formation of Alberta and the Prophet Formation of northeastern British Columbia; an undetermined species occurs in the Debolt Formation of northeastern British Columbia.

In the United States, the taxon is known from single occurrences in Zones IIB, IIIA, and IIID (questionable). It is found in the Mission Canyon Limestone of Wyoming, the Castle Reef Dolomite of Montana, the Perdido Formation of California (questionable), and the Scott Peak Formation of Idaho. It occurs exclusively in the shallow-water shelf-carbonate lithofacies.

Genus *TURBINATOCANINIA* Dobrolyubova, 1970

Plate 10, figures 5, 6

Diagnosis.—Solitary, curved or straight, conical rugose corals. Major septa well developed, sometimes thickened in cardinal quadrants in tabularium. Minor septa thin, confined to dissepimentarium. Young stages have a complex columella composed of axial plate, radial lamellae, and tabellae, but adult stages do not have a columella. Tabulae horizontal except at axis where they are turned up. Dissepimentarium regular.

Nominal species in Western Interior Province.—None.

Discussion.—Sando (1975b, p. C19) referred fragmentary corals having a columella in young stages and the morphology of *Caninia* in adult stages to this genus. The

name is used with a query because the fragmentary nature of the specimens leaves doubts concerning their identity.

Distribution.—*Turbinatocaninia*? is a rare coral found only in Zones V and VI of the Western Interior Province of the United States. It occurs in the Amsden Formation of Wyoming and the Heath Formation of Montana. It may also be present in the Monroe Canyon Limestone of Idaho. This taxon occurs exclusively in the shallow-water shelf-carbonate lithofacies.

Genus VESICULOPHYLLUM Easton, 1944

Plate 10, figures 7, 8

Diagnosis.—Large solitary cylindrical rugose corals having numerous major septa that ordinarily closely approach the axis of the corallum but may be short. Septal plan bilateral, palmate, or radial. Cardinal septum long or short, may or may not be in a fossula. Counter septum ordinarily short. Septa ordinarily dilated, dilation confined to axial region of corallum in later growth stages. Minor septa short and impersistent or absent. Dissepimentarium broad, consisting of an outer zone of lonsdaleoid dissepiments and an inner zone of regular dissepiments. Tabulae numerous, incomplete, steeply inclined axially or bowlshaped, gradational with dissepiments.

Nominal species in Western Interior Province.—*V. bilateralis* (Easton, 1945), *V. burlingi* (Sutherland, 1958), *V. dux* (Sutherland, 1954), *V. incrassatum* (Easton and Gutschick, 1953). *V. incrassatum* includes junior synonyms *Caninophyllum sonorensis* Easton, 1958, *Erygmophyllum californiense* Langenheim and Tischler, 1960, and *Vesiculophyllum sutherlandi* Armstrong, 1962.

Discussion.—*Vesiculophyllum* is characterized by extreme ontogenetic and individual variation (see Sando, 1969, p. 298–305). It has a weak outer zone of dissepiments that was commonly eroded away prior to deposition; most specimens are fragmentary. Because these characteristics cause great difficulty in discrimination of species, the number of species present in the Western Interior Province is unknown. Some of the nominal species listed above may be synonyms in addition to synonyms already determined. Ultimately, the large number of specimens from many localities may have to be referred to a single species because of difficulties in discrimination resulting from such great variation in a single collection.

Vesiculophyllum is a member of the Family Uraliniidae, a group of solitary rugose corals characterized by their peculiar septal plan, concave tabulae, and well-developed dissepimentarium. In North

America, *Kakwiphyllum* Sutherland, 1954, is a junior synonym. *Clinophyllum* Grove, 1935, may be merely a young stage of *Vesiculophyllum*. Among Russian representatives of the family, *Erygmophyllum* Fomichev, 1931, *Humboldtia* Stuckenberg, 1895, and *Keyserlingophyllum* Stuckenberg, 1895, may be senior synonyms; these genera have not been investigated in sufficient detail for a decision on synonymy.

Distribution.—*Vesiculophyllum* is the most common coral in the Mississippian of the Western Interior Province. In the United States, specimens questionably referred to the genus were found in the uppermost Devonian (Famennian) and in Zone IA of the Mississippian. The genus is rare in Zones IB and C, then becomes common from the base of Zone IIA to the top of Zone IIIA. It is rare in Zones IIIB and C. The genus is found in the Madison, Lodgepole, and Mission Canyon Limestones of Wyoming; the Allan Mountain Limestone, Castle Reef Dolomite, Lodgepole Limestone, Mission Canyon Limestone, and Charles Formation of Montana; the Mission Canyon Limestone of North Dakota; the Lodgepole and Mission Canyon Limestones of Idaho; the Lodgepole Limestone, Brazer Dolomite, Gardison Limestone, Joana Limestone, and Fitchville Formation of Utah; the Pahasapa Limestone of South Dakota; the Tin Mountain Limestone of California; the Redwall Limestone of Arizona; the Leadville Limestone of Colorado; and the Joana, Monte Cristo, Mercury, and Bristol Pass Limestones of Nevada.

In Canada, *Vesiculophyllum* ranges from the upper part of Zone I into Zone IIIC. It occurs in the Lodgepole Limestone, Mission Canyon Limestone, and Charles Formation of Saskatchewan; the Banff, Pekisko, Shunda, Turner Valley, and Livingstone Formations of Alberta; the Banff, Prophet, Pekisko, Shunda, Debolt, and Turner Valley Formations of British Columbia; and the Flett Formation of the southwestern District of Mackenzie. *Vesiculophyllum* occurs predominantly in shallow-water lithofacies.

Genus ZAPHRIPHYLLUM Sutherland, 1954

Plate 10, figures 3, 4

Diagnosis.—Small to medium-sized trochoid solitary rugose corals having numerous long major septa that tend to be radially arranged. Cardinal fossula well developed on convex side of corallum. Alar fossulae present. Minor septa moderately long. Tabulae mostly incomplete, arched periaxially and downturned into cardinal fossula. Dissepimentarium regular, well developed in ephebic stage.

Nominal species in Western Interior Province.—*Z. disseptum* Sutherland, 1954.

Discussion.—This taxon includes some corals previously referred to *Canadiphyllum* with a query (see Sando, Dutro, and Gere, 1959). *Zaphriphyllum* is like the “zaphrentoid” corals in having a simple skeleton but differs in having a well-developed dissepimentarium at maturity. The genus may have been derived from *Lophophyllum*?

Distribution.—In the United States, *Zaphriphyllum* has a sporadic range from the lower part of Zone IIB to the top of Zone IIIA; it is most common in the lower half of Zone IIIA. It occurs in the Madison and Mission Canyon Limestones of Wyoming; the Mission Canyon Limestone, Charles Formation, and Castle Reef Dolomite of Montana; the Mission Canyon Limestone of Idaho; and the Brazer Dolomite of Utah.

In Canada, the genus ranges from the middle of Zone IIB into Zone IIIC; it is most common from the upper part of Zone IIB to the middle of Zone IIIB. It occurs in the Banff, Pekisko, Shunda, Turner Valley, Livingstone, and Mount Head Formations of Alberta; the Prophet, Debolt, Pekisko, Shunda, and Turner Valley Formations of northeastern British Columbia; and the Flett Formation of southwestern District of Mackenzie. *Zaphriphyllum* occurs exclusively in the shallow-water shelf-carbonate lithofacies.

LOCALITY REGISTER

UNITED STATES

The following list includes (1) localities represented by detailed measured sections (in plate captions, referred to as “sections”) and (2) localities not represented by such sections (in plate captions, referred to as “localities”). Localities not represented by sections are mostly taken from unpublished reports on referred collections by Sando and other members of the U.S. Geological Survey. Many of these localities are composite, segregated by township in the land grid system. Localities in both categories are listed alphabetically by State. Geographic location, published or unpublished references, coralliferous formations, coral zones identified, and a list of genera and subgenera present are given for each locality.

DETAILED MEASURED SECTIONS

ARIZONA

- A-1. North Kaibab Trail, 0.75 mi east of Grand Canyon Lodge, Coconino County (see Sando, 1969). Redwall Limestone. Zone II. *Sychnoelasma*, *Syringopora*, *Vesiculophyllum*.

- A-2. Havasu Canyon, 2 mi northwest of Supai Indian Village, Coconino County (see Sando, 1969). Redwall Limestone. Zones II, IIIB. *Dorlodotia*?, *Sychnoelasma*, *Syringopora*, *Vesiculophyllum*.
- A-3. Whitmore Wash, 16 mi southeast of Mt. Trumbull P.O. in T. 32 N., R. 8 W., Coconino County (see Sando, 1969). Redwall Limestone. Zones II, IIIB. *Dorlodotia*?, *Sychnoelasma*, *Syringopora*, *Vesiculophyllum*.
- A-4. Parashant Canyon, 13 mi south of Mt. Trumbull P.O. in T. 32 N., R. 9 W., Coconino County (see Sando, 1969). Redwall Limestone. Zones II, IIIB. *Dorlodotia*?, *Syringopora*, *Vesiculophyllum*.
- A-5. Grand Wash Cliffs, south fork of Pigeon Wash, 6 mi north of Snap Point in T. 34 N., R. 14 W., Coconino County (see Sando, 1969). Redwall Limestone. Zones II, IIIC. *Dorlodotia*?, *Ekvasophyllum*, *Vesiculophyllum*.
- A-6. Pakoon, Whitney Ridge, Virgin Mountains in T. 36 N.(?), R. 16 W., Coconino County (see Sando, 1969). Redwall Limestone. Zones II, IIIB, IIIC. *Amplexizaphrentis*, *Caninia*, *Dorlodotia*?, *Ekvasophyllum*, *Syringopora*, *Vesiculophyllum*.
- A-7. Iceberg Canyon, west side of Iceberg Ridge, Lake Mead Recreation Area in T. 32 N., R. 16 W., Mohave County (see Sando, 1969). Redwall Limestone. Zones II, IIIB, IIIC?. *Amplexizaphrentis*, *Cyathaxonia*, *Dorlodotia*?, *Syringopora*, *Vesiculophyllum*.
- A-8. Quartermaster Canyon, Hualapai Indian Reservation in T. 30 N., R. 14 W., Mohave County (see Sando, 1969). Redwall Limestone. *Amplexizaphrentis*, *Dorlodotia*?, *Sychnoelasma*, *Syringopora*, *Vesiculophyllum*.
- A-9. Bridge Canyon, east side of canyon, near corner of secs. 10 and 14, T. 27 N., R. 12 W., Mohave County (see Sando, 1969). Redwall Limestone. Zones II, IIIA, IIIB. *Amplexizaphrentis*, *Dorlodotia*?, *Siphonodendron*, *Sychnoelasma*, *Syringopora*, *Vesiculophyllum*.
- A-10. Hindu Canyon, sec. 23, T. 27 N., R. 12 W., Mohave County (see Sando, 1969). Redwall Limestone. Zones II, IIIA. *Amplexizaphrentis*, *Siphonodendron*, *Sychnoelasma*, *Vesiculophyllum*.
- A-11. Diamond Creek, secs. 4, 5, T. 27 N., R. 10 W., Mohave County (see Sando, 1969). Redwall Limestone. Zone IIIA. *Siphonodendron*, *Syringopora*.
- A-12. Metuck Canyon, 3 to 4 mi north of Metuck Tank, Coconino County (see Sando, 1969). Redwall Limestone. Zones IIIA, IIIB. *Dorlodotia*?, *Siphonodendron*, *Syringopora*, *Vesiculophyllum*.
- A-13. Peach Springs-Nelson, east side of gully 0.3 mi east of Nelson Station and quarry at Nelson station, Mohave County (see Sando, 1969). Redwall Limestone. Zones II, IIIA, IIIB. *Dorlodotia*?, *Siphonodendron*, *Sychnoelasma*, *Syringopora*, *Vesiculophyllum*.
- A-14. Ring Cone, near center sec. 20, T. 23 N., R. 11 W., Mohave County (see Sando, 1969). Redwall Limestone. Zone II. *Amplexizaphrentis*, *Vesiculophyllum*.
- A-15. Seligman Field, sec. 4, T. 22 N., R. 8 W., Yavapai County (see Sando, 1969). Redwall Limestone. Zone II. *Sychnoelasma*, *Vesiculophyllum*.
- A-16. Chino Point, sec. 3, T. 22 N., R. 7 W., Yavapai County (see Sando, 1969). Redwall Limestone. Zone II. *Sychnoelasma*?, *Vesiculophyllum*.
- A-17. Pichacho Butte, sec. 18, T. 21 N., R. 4 W., Yavapai County (see Sando, 1969). Redwall Limestone. Zone II. *Syringopora*.
- A-18. Black Mesa composite, along Black Mesa north of Chino Valley from U.S. Highway 89 West to South Butte, Yavapai County (see Sando, 1969). Redwall Limestone. Zone II.

Amplexizaphrentis, *Michelinia*, *Sychnoelasma*, *Syringopora*, *Vesiculophyllum*.

- A-19. Drake quarry, sec. 32, T. 19 N., R. 1 W., Yavapai County (see Sando, 1969). Redwall Limestone. Zone II. *Amplexizaphrentis*, *Michelinia*, *Stelechophyllum*, *Sychnoelasma*, *Syringopora*, *Vesiculophyllum*.
- A-20. Simmons, sec. 1, T. 16 N., R. 3 W., Yavapai County (see Sando, 1969). Redwall Limestone. Zone II. *Vesiculophyllum*.
- A-21. Lonesome Valley, sec. 14, T. 16 N., R. 1 W., Yavapai County (see Sando, 1969). Redwall Limestone. Zone II. *Amplexizaphrentis*.
- A-22. Sycamore Canyon, secs. 31, 32, T. 18 N., R. 3 E., Yavapai County (see Sando, 1969). Redwall Limestone. Zone II. *Sychnoelasma*, *Syringopora*, *Vesiculophyllum*.
- A-23. Mingus Pass composite, in roadcut on north side of U.S. Highway 89, about 5 mi west of Jerome and in sec. 12, T. 16 N., R. 1 E., Yavapai County (see Sando, 1969). Redwall Limestone. Zone II. *Amplexizaphrentis*, *Michelinia*, *Stelechophyllum*, *Sychnoelasma*, *Syringopora*, *Vesiculophyllum*.
- A-24. Jerome composite, sec. 21, T. 16 N., R. 2 E., Yavapai County (see Sando, 1969). Redwall Limestone. Zone II. *Amplexizaphrentis*, *Michelinia*, *Sychnoelasma*, *Syringopora*, *Vesiculophyllum*.
- A-25. Clemenceau quarry, sec. 7, T. 15 N., R. 3 E., Yavapai County (see Sando, 1969). Redwall Limestone. Zone II. *Amplexizaphrentis*, *Vesiculophyllum*.
- A-26. Natural Bridge, sec. 8, T. 11 N., R. 9 E., Gila County (see Sando, 1969). Redwall Limestone. Zone II. *Amplexizaphrentis*, *Syringopora*.
- A-27. Pine composite, secs. 6, 7, T. 11 N., R. 10 E., Gila County (see Sando, 1969). Redwall Limestone. Zone II. *Amplexizaphrentis*, *Cyathaxonia*, *Michelinia*, *Sychnoelasma*, *Syringopora*, *Vesiculophyllum*.
- A-28. Colcord Canyon, sec. 34, T. 10 1/2 N., R. 14 E., Gila County (see Sando, 1969). Redwall Limestone. Zone II. *Stelechophyllum*, *Sychnoelasma*, *Syringopora*, *Vesiculophyllum*.
- A-29. O. W. Ranch 2, sec. 33, T. 10 1/2 N., R. 15 E., Gila County (see Sando, 1969). Redwall Limestone. Zone II. *Sychnoelasma*, *Syringopora*, *Vesiculophyllum*.
- A-30. Brush Mountain N.W., sec. 5, T. 7 N., R. 16 E., Navajo County (see Sando, 1969). Redwall Limestone. Zone II. *Michelinia*, *Vesiculophyllum*.
- A-31. Salt River Draw 1, sec. 24, T. 7 N., R. 16 E., Gila County (see Sando, 1969). Redwall Limestone. Zone II. *Michelinia*, *Sychnoelasma*, *Vesiculophyllum*.
- A-32. Salt River Draw 2, about 1 mi north of Rock House Butte, Gila County (see Sando, 1969). Redwall Limestone. Zone II. *Michelinia*.
- A-33. Salt River U.S. 60, sec. 20, T. 5 N., R. 18 E., Gila County (see Sando, 1969). Redwall Limestone. Zone II. *Amplexizaphrentis*, *Caninia*?, *Michelinia*, *Sychnoelasma*, *Syringopora*, *Vesiculophyllum*.
- A-34. Black River Crossing, sec. 11, T. 4 N., R. 20 E., Gila County (see Sando, 1969). Redwall Limestone. Zones I, II. *Amplexizaphrentis*, *Amplexus*, *Lophophyllum*?, *Michelinia*, *Syringopora*, *Vesiculophyllum*.

CALIFORNIA

- CA-1. Tin Mountain type section, southern slope of hills about 2.5 mi southeast of Quartz Spring and about 3,000 ft north

of road to Rest Spring, Inyo County (see Langenheim and Tischler, 1960). Tin Mountain Limestone. Zone II. *Amplexizaphrentis*, *Amplexus*, *Lophophyllum*?, *Vesiculophyllum*.

CA-2. Funeral Mountains, Hill 2997, northeast end of Funeral Mountains, Ryan quadrangle, Inyo County (see McAllister, 1974). Tin Mountain Limestone. Zones I?, II. *Amplexizaphrentis*, *Amplexus*, *Caninia*?, *Cyathaxonia*, *Guerichophyllum*, *Lophophyllum*?, *Michelinia*, *Sychnoelasma*, *Syringopora*, *Vesiculophyllum*.

IDAHO

- I-1. Black Mountain, secs. 23, 24, T. 3 N., R. 43 E., Bonneville County (see Sando, 1977c). Lodgepole and Mission Canyon Limestones. Zones 1C, II, IIIA. *Amplexizaphrentis*, *Amplexus*?, *Cyathaxonia*, "Diphyphyllum," *Guerichophyllum*, *Stelechophyllum*, *Sychnoelasma*, *Syringopora*, *Vesiculophyllum*, *Zaphriphyllum*.
- I-2. Sheep Creek, sec. 28, T. 1 N., R. 45 E., Bonneville County (see Sando, 1977c). Lodgepole and Mission Canyon Limestones. Zones II, IIIA. *Amplexizaphrentis*, *Ankhelesma*, *Cyathaxonia*, *Lophophyllum*?, *Michelinia*, *Siphonodendron*, *Stelechophyllum*, *Sychnoelasma*, *Syringopora*, *Vesiculophyllum*, *Zaphriphyllum*.
- I-3. Little Flat Canyon, secs. 17, 20, T. 7 S., R. 40 E., Bannock County (see Dutro and Sando, 1963). Lodgepole Limestone, Little Flat Formation, and Monroe Canyon Limestone. Zones 1B, IC, II, IIID, IV, VA, VB. *Acroclyathus* (cerioid), *Amplexizaphrentis*, *Amplexus*, *Canadiphyllum*, *Clisiophyllum*, *Cyathaxonia*, "Diphyphyllum," *Duncanopora*, *Ekuvasophyllum*, *Faberophyllum*, *Guerichophyllum*, *Lophophyllum*?, *Metriophyllum*, *Michelinia*, *Multiithecopora*, *Palaeacis*, *Pleurosiphonella*, "Pseudodorlodotia," *Siphonodendron*, *Siphonophyllia*, *Sychnoelasma*, *Syringopora*, *Turbinatocaninia*?, *Vesiculophyllum*.
- I-4. Hunter Canyon, sec. 35, T. 9 S., R. 31 E., Power County (see Trimble and Carr, 1976). Lodgepole Limestone, Deep Creek Formation, and Great Blue Limestone. Zones II, IV, V. *Amplexizaphrentis*, *Amplexus*, *Canadiphyllum*, *Clisiophyllum*, "Diphyphyllum," *Faberophyllum*, *Lophophyllum*?, *Pleurosiphonella*, *Rhopalolasma*, *Rotiphyllum*, *Schoenophyllum*, *Siphonophyllia*, *Stelechophyllum*, *Sychnoelasma*, *Syringopora*, *Vesiculophyllum*.
- I-5. East Canyon, sec. 1, T. 6 N., R. 29 E., Butte County (see Huh, 1968). Scott Peak and Surret Canyon Formations. Zones IIIB, IIIC, IIID, IV, VA, VB, VI. *Amplexizaphrentis*, *Barytichisma*, *Duncanopora*, *Ekuvasophyllum*, *Faberophyllum*, *Multiithecopora*, *Pleurosiphonella*, "Pseudodorlodotia," *Siphonodendron*, *Siphonophyllia*.
- I-6. Hawley Mountain, secs. 24, 25, T. 9 N., R. 26 E., Butte County (see Mamet and others, 1971). Middle Canyon, Scott Peak, and Surret Canyon Formations. Zones IIIB, IIIC, IIID, IV, VA, VB, VI. *Acroclyathus* (cerioid), *Actinocyathus*, *Amplexizaphrentis*, *Amplexus*, *Barytichisma*, *Canadiphyllum*, *Caninia*, *Cyathaxonia*, *Duncanopora*, *Ekuvasophyllum*, *Faberophyllum*, *Multiithecopora*, *Palaeacis*, *Petalaxis*, *Pleurosiphonella*, "Pseudodorlodotia," *Rotiphyllum*, *Siphonodendron*, *Siphonophyllia*, *Syringopora*?
- I-7. Devils Canyon, sec. 6, T. 12 N., R. 21 E., Custer County (see Mamet and others, 1971). Scott Peak Formation. Zones IIID, IV. *Amplexizaphrentis*, *Canadiphyllum*, *Faberophyllum*, *Pleurosiphonella*, "Pseudodorlodotia."

- I-8. McGowan Creek, sec. 28, T. 12 N., R. 21 E., Custer County (see Mamet and others, 1971). Scott Peak Formation. Zones IIID, IV. *Amplexizaphrentis*, *Cyathaxonia*, *Faberophyllum*, *Rotiphyllum*, *Syringopora*.
- I-9. Christian Gulch, secs. 32, 33, T. 12 N., R. 22 E. (see Mamet and others, 1971). Scott Peak and Surret Canyon Formations. Zones IIID, IV, VA, VB. *Actinocyathus*, *Amplexizaphrentis*, *Duncanopora*, *Faberophyllum*, *Multiithecopora*, *Pleurosiphonella*, "*Pseudodorlodotia*," *Siphonodendron*, *Siphonophyllia*, *Syringopora*.
- I-10. Van Dorn Canyon, Sec. 11, T. 8 N., R. 26 E., Butte County (see Mamet and others, 1971). Surret Canyon Formation. Zone VB. *Duncanopora*, *Siphonophyllia*.
- I-11. Cherry Creek, secs. 32, 33, T. 5 N., R. 24 E., Custer County (see Skipp, 1961). Scott Peak Formation. Zone IV. *Clisiophyllum*, *Faberophyllum*, *Syringopora*.
- I-12. Timbered Dome, sec. 3, T. 4 N., R. 25 E., Butte County (see Skipp, 1961). Surret Canyon Formation. Zone V. *Duncanopora*, "*Pseudodorlodotia*," *Siphonophyllia*.
- I-13. Cabin Creek, secs. 13, 14, 15, T. 6 N., R. 22 E., Custer County (see Skipp and Mamet, 1970). White Knob Limestone. Zone indeterminate. *Michelinia*, *Rotiphyllum*?
- I-14. Wood Canyon, secs. 29, 30, T. 5 N., R. 25 E. Custer County (Betty Skipp, unpublished data, 1970). Scott Peak and Surret Canyon Formations. Zones IV, VA, VB. *Amplexizaphrentis*, *Ekvasophyllum*?, *Faberophyllum*, *Multiithecopora*, *Pleurosiphonella*, *Rotiphyllum*?, *Siphonophyllia*.
- I-15. North Georgetown Canyon, secs. 16, 21, T. 10 S., R. 44 E., Bear Lake County (Sando, Sandberg, and Gutschick, 1981). Aspen Range Formation and Mission Canyon Limestone. Zones IIB, IIIC, IIID, IV, VB. *Acrocyathus* (cerioid) *Amplexizaphrentis*, *Canadiphyllum*, *Clisiophyllum*, *Cyathaxonia*, *Duncanopora*, *Ekvasophyllum*, *Faberophyllum*, *Hapsiphyllum*, *Lophophyllum*?, *Michelinia*, *Multiithecopora*, *Pleurosiphonella*, "*Pseudodorlodotia*," *Rotiphyllum*, *Siphonodendron*, *Siphonophyllia*, *Sychnoelasma*, *Syringopora*, *Vesiculophyllum*.
- M-1. Diversion Dam and Hannan Gulch, secs. 35, 36, T. 22 N., R. 9 W., Teton County (see Mudge, Sando, and Dutro, 1962). Allan Mountain Limestone and Castle Reef Dolomite. Zones II, IIIA. *Amplexizaphrentis*, *Ankhelasma*, *Caninia*, *Cyathaxonia*, *Lophophyllum*?, *Siphonodendron*, *Stelechophyllum*, *Sychnoelasma*, *Syringopora*, "*Thysanophyllum*," *Vesiculophyllum*, *Zaphriphyllum*.
- M-2. Gibson Dam and Gibson Reservoir, secs. 4, 6, T. 21 N., R. 9 W., and sec. 31, T. 22 N., R. 9 W., Teton County (see Mudge, Sando, and Dutro, 1962). Allan Mountain Limestone and Castle Reef Dolomite. Zones IB, IC, II, IIIA. *Amplexizaphrentis*, *Amplexus*, *Cyathaxonia*, *Hapsiphyllum*, *Liardiphyllum*, *Lophophyllum*?, *Metriophyllum*, *Michelinia*, *Neaxon*?, *Pleurosiphonella*, *Rotiphyllum*, *Sychnoelasma*, *Syringopora*, *Vesiculophyllum*, *Zaphriphyllum*.
- M-3. Mission Canyon, sec. 32, T. 26 N., R. 24 E., Blaine County (see Sando and Dutro, 1974). Mission Canyon Limestone. Zone II. *Lophophyllum*?, *Michelinia*, *Sychnoelasma*, *Syringopora*, *Vesiculophyllum*.
- M-4. Little Chief Canyon, secs. 19, 30, T. 26 N., R. 25 E., Blaine County (see Sando and Dutro, 1974). Lodgepole and Mission Canyon Limestones. Zones I, II. *Amplexizaphrentis*, *Amplexocarinia*, *Amplexus*, *Caninia*, *Cleistopora*, *Cyathaxonia*, *Lophophyllum*?, *Michelinia*, *Stelechophyllum*, *Sychnoelasma*, *Syringopora*, *Vesiculophyllum*.
- M-5. California Co., Grimm No. 1 well core, sec. 13, T. 32 N., R. 49 E., Roosevelt County (see Sando, 1978). Mission Canyon Limestone. Zones II, IIIA. *Siphonodendron*, *Vesiculophyllum*.
- M-6. Hodge, Smith, and Hodge Co., No. 1 Eggebrecht well core, sec. 3, T. 23 N., R. 49 E., McCone County (see Sando, 1978). Mission Canyon Limestone and Charles Formation. Zones II, IIIA. *Amplexizaphrentis*, *Cyathaxonia*, "*Diphyphyllum*," *Lophophyllum*?, *Michelinia*, *Siphonodendron*, *Sychnoelasma*, *Syringopora*, *Vesiculophyllum*.
- M-7. Shell Oil Co., Richey area, Northern Pacific Railroad No. 1 well core, sec. 19, T. 23 N., R. 50 E., Dawson County (see Sando, 1978). Lodgepole Limestone, Mission Canyon Limestone, and Charles Formation. Zones II, IIIA. *Amplexizaphrentis*, "*Diphyphyllum*," *Lophophyllum*?, *Michelinia*, *Sychnoelasma*, *Syringopora*, *Vesiculophyllum*, *Zaphriphyllum*?
- M-8. C. H. Murphy Co., East Poplar Unit No. 1 well core, sec. 2, T. 28 N., R. 51 E., Roosevelt County (see Sando, 1978). Lodgepole and Mission Canyon Limestones. Zones II, IIIA. *Amplexizaphrentis*, "*Diphyphyllum*," *Lophophyllum*?, *Rotiphyllum*, *Siphonodendron*, *Sychnoelasma*, *Syringopora*, *Vesiculophyllum*.
- M-9. Shell Oil Co., Pine Unit No. 1 well core, sec. 30, T. 12 N., R. 57 E., Wibaux County (see Sando, 1978). Lodgepole and Mission Canyon Limestones and Charles Formation. Zones I, II, IIIA. *Amplexizaphrentis*, *Amplexocarinia*, *Amplexus*, *Caninia*, *Cleistopora*, *Cyathaxonia*, "*Diphyphyllum*," *Lophophyllum*?, *Pleurosiphonella*, *Sychnoelasma*, *Syringopora*, *Vesiculophyllum*, *Zaphriphyllum*.
- M-10. Damm No. F-33-23-P well core, sec. 23, T. 29 N., R. 54 E., Roosevelt County (see Sando, 1978). Mission Canyon Limestone. Zones II, IIIA? *Siphonodendron*?, *Syringopora*, *Vesiculophyllum*.
- M-11. Dry Fork, sec. 36, T. 16 N., R. 7 E., Cascade County (see Sando and Dutro, 1974). Lodgepole and Mission Canyon Limestones. Zones I, II. *Amplexizaphrentis*, *Amplexus*, *Aulostylus*, *Cyathaxonia*, *Guerichophyllum*, *Lophophyllum*?, *Michelinia*, *Stelechophyllum*, *Sychnoelasma*, *Syringopora*, *Vesiculophyllum*.
- M-12. Monarch-U.S. 89, secs. 22, 27, T. 16 N., R. 7 E., Cascade County (see Sando and Dutro, 1974). Mission Canyon Limestone. Zones II, IIIA. *Amplexizaphrentis*, "*Diphyphyllum*?", *Lophophyllum*?, *Stelechophyllum*, *Sychnoelasma*, *Syringopora*, *Vesiculophyllum*.
- M-13. Indian Creek, sec. 32, T. 7 N., R. 1 E., Broadwater County (W. J. Sando, unpublished data, 1962). Big Snowy Formation. Zone V. *Siphonophyllia*?
- M-14. Stonehouse Canyon, sec. 25, T. 11 N., R. 20 E., Golden Valley County (see Easton, 1962). Heath Formation. Zone V. *Amplexizaphrentis*, *Siphonophyllia*, *Turbinatocaninia*?
- M-15. Hopley Creek, secs. 5, 8, T. 10 N., R. 13 E., Wheatland County (see Gardner and others, 1946). Heath Formation. Zone V. *Siphonophyllia*, *Turbinatocaninia*?
- M-16. Moss Agate, sec. 6, T. 7 N., R. 8 E., Meagher County (see Gardner and others, 1946). Otter Formation. Zone V. *Siphonophyllia*.
- M-17. Delpine, sec. 14, T. 9 N., R. 10 E., Meagher County (see Easton, 1962). Otter Formation. Zones IV, V. *Amplexizaphrentis*, *Siphonophyllia*, *Clisiophyllum*?

MONTANA

- M-18. Potter Creek, secs. 5, 8, T. 13 N., R. 21 E., Fergus County (see Easton, 1962). Otter Formation? Zone V? *Amplexizaphrentis*.
- M-19. Logan, sec. 25, T. 2 N., R. 2 E., Gallatin County (see Sando and Dutro, 1974). Lodgepole and Mission Canyon Limestones. Zone IB, IC, II, IIIA. *Amplexizaphrentis*, *Amplexocarina*, *Amplexus*, *Cyathaxonia*, "Diphyphyllum," *Guerichophyllum*, *Lophophyllum*?, *Metriophyllum*, *Michelinia*, *Neaxon*?, *Stelechophyllum*, *Sychnoelasma*, *Syringopora*, *Vesiculophyllum*.
- M-20. Lombard, sec. 7, T. 4 N., R. 3 E., Broadwater County (J. T. Dutro, Jr., unpublished data, 1957). Big Snowy Formation. Zone V. *Siphonophyllia*.
- M-21. Sacajawea Peak, sec. 27, T. 2 N., R. 6 E., Gallatin County (W. J. Sando, unpublished data, 1962). Lodgepole and Mission Canyon Limestones. Zones IB, IC, II, IIIA. *Amplexizaphrentis*, *Amplexus*, *Cyathaxonia*, "Diphyphyllum," *Lophophyllum*?, *Metriophyllum*, *Michelinia*, *Neaxon*?, *Palaeacis*, *Stelechophyllum*, *Sychnoelasma*, *Syringopora*, *Vesiculophyllum*.
- M-22. South Angler Lake, sec. 15, T. 2 N., R. 6 E., Gallatin County (W. J. Sando, unpublished data, 1962). Big Snowy Formation. Zone V. *Multithecopora*, *Siphonophyllia*.
- M-23. Baldy Mountain, secs. 26, 27, 35, T. 7 S., R. 3 W., Madison County (see Sando and Dutro, 1980). Lodgepole Limestone, Mission Canyon Limestone, and Big Snowy Formation. Zones IB, IC, II, IIIA, V. *Amplexizaphrentis*, *Amplexus*, *Aulostylus*, *Cyathaxonia*, "Diphyphyllum," *Guerichophyllum*, *Michelinia*, *Multithecopora*, *Neaxon*?, *Palaeacis*, *Siphonophyllia*, *Stelechophyllum*, *Sychnoelasma*, *Syringopora*, *Vesiculophyllum*, *Zaphriphyllum*.
- M-24. White Peak, secs. 1, 2, T. 11 S., R. 4 E., Gallatin County (see Witkind, 1969). Lodgepole and Mission Canyon Limestones. Zones IB, IC, II. *Amplexizaphrentis*, *Amplexus*, *Cleistopora*, *Cyathaxonia*, *Lophophyllum*?, *Metriophyllum*, *Michelinia*, *Stelechophyllum*, *Sychnoelasma*, *Syringopora*, *Vesiculophyllum*.
- M-25. Squaw Creek, sec. 34, T. 4 S., R. 4 E., Gallatin County (W. J. Sando, unpublished data, 1962). Lodgepole and Mission Canyon Limestones. Zones IB, IC, II, IIIA. *Amplexizaphrentis*, *Amplexocarina*, *Cyathaxonia*, *Guerichophyllum*, *Lophophyllum*?, *Michelinia*, *Pleurosiphonella*, *Stelechophyllum*, *Sychnoelasma*, *Syringopora*, *Vesiculophyllum*.
- M-26. Livingston, secs. 1, 2, T. 3 S., R. 9 E., and sec. 35, T. 2 S., R. 9 E., Park County (see Sando, 1972b). Lodgepole and Mission Canyon Limestones. Zones IB, IC, II. *Amplexizaphrentis*, *Amplexus*, *Caninia*, *Cyathaxonia*, *Guerichophyllum*, *Lophophyllum*?, *Neaxon*?, *Rotiphyllum*?, *Sychnoelasma*, *Syringopora*, *Vesiculophyllum*.
- M-27. Baker Mountain, secs. 34, 35, T. 3 S., R. 12 E., and sec. 29, T. 3 S., R. 13 E., Park and Sweet Grass Counties (see Sando, 1972b). Lodgepole and Mission Canyon Limestones. Zones IB, IC, II, III. *Amplexizaphrentis*, *Caninia*?, "Diphyphyllum," *Lophophyllum*?, *Palaeacis*, *Stelechophyllum*, *Sychnoelasma*, *Syringopora*, *Vesiculophyllum*.
- M-28. Picket Pin Ridge, sec. 33, T. 4 S., R. 14 E., Sweet Grass County (see Sando, 1972b). Lodgepole Limestone. Zone IC. *Amplexizaphrentis*, *Cyathaxonia*, *Cleistopora*, *Guerichophyllum*, *Lophophyllum*?, *Michelinia*, *Syringopora*, *Vesiculophyllum*.
- M-29. West Stillwater River, secs. 1, 2, T. 5 S., R. 14 E., Sweet Grass County (see Sando, 1972b). Madison Limestone. Zones IC, II. *Amplexizaphrentis*, *Amplexus*, *Cleistopora*, *Cyathaxonia*, *Lophophyllum*?, *Sychnoelasma*, *Syringopora*, *Vesiculophyllum*.
- M-30. Ben Bow Mine Road, secs. 20, 29, T. 5 S., R. 16 E., Stillwater County (see Sando, 1972b). Madison Limestone. Zones IC, II, IIIA. *Amplexizaphrentis*, *Cyathaxonia*, "Diphyphyllum," *Lophophyllum*?, *Michelinia*, *Syringopora*, *Vesiculophyllum*.
- M-31. West Red Lodge Creek, sec. 10, T. 7 S., R. 18 E., Carbon County (see Sando, 1972b). Madison Limestone. Zone II. *Lophophyllum*?, *Michelinia*, *Stelechophyllum*, *Sychnoelasma*, *Syringopora*, *Vesiculophyllum*.
- M-32. Point of Rocks, sec. 17, T. 8 S., R. 20 E., Carbon County (see Sando, 1972b). Madison Limestone. Zone II. *Michelinia*, *Vesiculophyllum*.
- M-33. South Grove Creek, sec. 35, T. 8 S., R. 20 E., Carbon County (see Sando, 1972b). Madison Limestone. Zones IC, II. *Syringopora*, *Vesiculophyllum*.
- M-34. Devils Canyon, secs. 25, 36, T. 9 S., R. 28 E., Big Horn County (W. J. Sando, unpublished data, 1966). Madison Limestone. Zones IC, II, IIIA. *Lophophyllum*?, *Stelechophyllum*, *Sychnoelasma*, *Syringopora*, *Vesiculophyllum*.
- M-35. Little Dryhead Canyon, sec. 23, T. 7 S., R. 27 E., Carbon County (W. J. Sando, unpublished data, 1966). Madison Limestone. Zone II. *Syringopora*, *Vesiculophyllum*.

NORTH DAKOTA

- ND-1. Texas Co., Donahue No. 1 well core, sec. 23, T. 154 N., R. 100 W., Williams County (see Sando, 1978). Mission Canyon Limestone. Zone II. *Amplexizaphrentis*?, *Cyathaxonia*, *Syringopora*.

UTAH

- U-1. Old Laketown Canyon, sec. 32, T. 13 N., R. 6 E., Rich County (see Sando, Dutro, and Gere, 1959). Lodgepole Limestone, Little Flat Formation, and Monroe Canyon Limestone. Zones II, IIIA, IIID, IV. *Amplexizaphrentis*, *Amplexus*, *Canadiphyllum*, *Clisiophyllum*, *Dorlodotia*?, *Ekvasophyllum*, *Faberophyllum*, *Michelinia*, *Rhopalolasma*, *Rotiphyllum*?, *Pleurosiphonella*, *Stelechophyllum*, *Sychnoelasma*, *Syringopora*, *Vesiculophyllum*.
- U-2. Emma Canyon, sec. 17, T. 11 N., R. 8 E., Rich County (see Sando, Dutro, and Gere, 1959). Lodgepole Limestone and Brazer Dolomite. Zones IB, IC, II, IIIA. *Amplexizaphrentis*, *Amplexocarina*?, *Amplexus*, *Ankhelasma*, *Cleistopora*, *Cyathaxonia*, *Guerichophyllum*, *Lophophyllum*?, *Michelinia*?, *Stelechophyllum*, *Sychnoelasma*, *Syringopora*, *Vesiculophyllum*, *Zaphriphyllum*.
- U-3. Brazer Canyon, sec. 20, T. 11 N., R. 8 E., Rich County (see Sando, Dutro, and Gere, 1959). Lodgepole Limestone and Brazer Dolomite. Zones IB, IC, II, IIIA. *Amplexizaphrentis*, *Amplexocarina*, *Amplexus*, *Ankhelasma*, *Beaumontia*, *Cleistopora*, *Cyathaxonia*, *Guerichophyllum*, *Lophophyllum*?, *Metriophyllum*, *Michelinia*, *Neaxon*?, *Palaeacis*, *Stelechophyllum*, *Syringopora*, *Vesiculophyllum*, *Zaphriphyllum*.
- U-4. Rex Peak, sec. 31, T. 11 N., R. 8 E., Rich County (see Sando, Dutro, and Gere, 1959). Lodgepole Limestone and Brazer Dolomite. Zones II, IIIA. *Amplexizaphrentis*, *Ankhelasma*,

- Sychnoelasma*, *Syringopora*, *Vesiculophyllum*, *Zaphriphyllum*.
- U-5. Ogden Canyon, sec. 17, T. 6 N., R. 1 E., Weber County (W. J. Sando, unpublished data, 1961). Lodgepole Limestone, Brazer Dolomite, and Deseret Limestone. Zone II. *Amplexizaphrentis*, *Amplexus*, *Cyathaxonia*, *Michelinia*, *Neaxon?*, *Stelechophyllum*, *Sychnoelasma*, *Syringopora*, *Vesiculophyllum*.
- U-6. Flux, sec. 31, T. 1 S., R. 6 W., Tooele County (see Sandberg and Gutschick, 1979). Deseret Limestone and Humbug Formation. Zones II, IIID. *Acrocyathus* (cerioid), *Canadiphyllum*, *Cyathaxonia*, *Ekvasophyllum*, *Palaeacis*, *Pleurosiphonella*, *Siphonodendron*.
- U-7. Ophir Canyon, sec. 22, T. 5 S., R. 4 W., Tooele County (R. C. Gutschick and Mackenzie Gordon, Jr., unpublished data, 1953 and 1976). Gardison Limestone, Deseret Limestone, and Humbug Formation. Zones II, IIIA, IIIB, IIIC, IIID, IV. *Amplexizaphrentis*, *Amplexus?*, *Canadiphyllum*, *Cyathaxonia*, *Ekvasophyllum*, *Michelinia?*, *Pleurosiphonella*, *Rhopalolasma*, *Sychnoelasma*, *Vesiculophyllum*.
- U-8. Rock Canyon, sec. 28, T. 6 S., R. 3 E., Utah County (see Sandberg and Gutschick, 1979). Gardison Limestone and Deseret Limestone. Zones II, IIID. *Amplexizaphrentis*, *Amplexus*, *Canadiphyllum*, *Cyathaxonia*, *Rhopalolasma*, *Rotiphyllum*.
- U-9. Twelvemile Pass, sec. 22, T. 8 S., R. 3 W., Tooele County (Mackenzie Gordon, Jr., unpublished data, 1962). Deseret Limestone and Humbug Formation. Zones IIID, IV. *Amplexizaphrentis*, *Canadiphyllum*, *Clisiophyllum?*, *Ekvasophyllum*, *Faberophyllum*, *Pleurosiphonella*, "*Pseudodorlodotia*," *Rotiphyllum?*, *Syringopora?*.
- U-10. Gardison Ridge, sec. 1, T. 9 S., R. 3 W., Utah County (Mackenzie Gordon, Jr., unpublished data, 1953). Gardison Limestone. Zone II. *Amplexizaphrentis*, *Amplexus*, *Cyathaxonia*, *Lophophyllum?*, *Michelinia*, *Neaxon?*, *Stelechophyllum*, *Sychnoelasma*, *Syringopora*, *Vesiculophyllum*.
- U-11. Buckhorn Canyon, secs. 1, 2, T. 10 S., R. 12 W., Tooele County (see Gutschick, 1976). Joana Limestone and Woodman Formation. Zones I, II, III. *Amplexizaphrentis*, *Amplexus*, *Cyathaxonia*, *Lophophyllum?*, *Neaxon?*, *Vesiculophyllum*.
- U-12. Mammoth Peak-Sioux Creek, secs. 19, 30, T. 10 S., R. 2 W., Tooele County (R. C. Gutschick, unpublished data, 1976). Gardison Limestone and Deseret Limestone. Zones II, IIIA, IIIC, IIID. *Amplexizaphrentis*, *Canadiphyllum*, *Cyathaxonia*, *Guerichophyllum*, *Hapsiphyllum*, *Michelinia*, *Rhopalolasma?*, *Rotiphyllum*, *Vesiculophyllum?*.
- U-13. North Gillson Mountains, sec. 33, T. 13 S., R. 3 W., Juab County (R. C. Gutschick, unpublished data, 1976). Gardison Limestone, Deseret Limestone, and Humbug Formation. Zones II, IIIA. *Amplexizaphrentis*, *Amplexus*, *Aulostylus*, *Cyathaxonia*, *Guerichophyllum*, *Rhopalolasma*, *Rotiphyllum*, *Stelechophyllum*, *Sychnoelasma*, *Syringopora*, *Vesiculophyllum*.
- U-14. Dog Valley Mountain, sec. 21, T. 24 S., R. 6 W., Millard County (R. C. Gutschick, unpublished data, 1976). Gardison Limestone and Deseret Limestone. Zones II, IIIB. *Amplexizaphrentis*, *Amplexus*, *Cyathaxonia*, *Michelinia*.
- U-15. Dog Valley Peak, sec. 17, T. 25 S., R. 6 W., Millard County (R. C. Gutschick, unpublished data, 1976). Gardison Limestone and Deseret Limestone. Zones II, IIID. *Acrocyathus* (cerioid), *Amplexizaphrentis*, *Amplexus*, *Aulostylus*, *Canadiphyllum*, *Cyathaxonia*, *Ekvasophyllum*, *Hapsiphyllum*, *Koninckophyllum?*, *Lophophyllum?*, *Michelinia*, *Palaeacis?*, *Pleurosiphonella*, *Rotiphyllum*, *Siphonodendron*, *Sychnoelasma*, *Vesiculophyllum*.
- U-16. Elephant Canyon, secs. 24, 25, T. 28 S., R. 12 W., Beaver County (D. W. Lemmon, unpublished data, 1962). Gardison Limestone and Deseret Limestone. Zones II, IIID. *Amplexizaphrentis*, *Canadiphyllum*, *Cyathaxonia*, "*Diphyphyllum*," *Ekvasophyllum*, *Multithecopora*, *Siphonodendron*, *Sychnoelasma*, *Syringopora*, *Vesiculophyllum*.
- U-17. Shauntie Hills, sec. 13, T. 29 S., R. 13 W., Beaver Co. (D. W. Lemmon, unpublished data, 1962). Zones IIID, IV. Deseret Limestone, Humbug Formation, and Great Blue Limestone. *Acrocyathus* (cerioid), *Amplexizaphrentis*, *Canadiphyllum*, *Cyathaxonia*, *Ekvasophyllum*, *Faberophyllum*, *Koninckophyllum?*, *Rhopalolasma*, *Siphonodendron*, *Syringopora*.
- U-18. Green Ravine, sec. 1, T. 2 S., R. 4 W., and sec. 6, T. 2 S., R. 3 W., Tooele County (see Tooker and Roberts, 1970). Green Ravine Formation. Zone VB. *Actinocyathus*, *Amplexizaphrentis*, *Duncanopora*, *Multithecopora*, *Siphonophyllia*.
- U-19. Fitchville Ridge, sec. 19, T. 10 S., R. 2 W., Juab County (R. C. Gutschick, unpublished data, 1977). Fitchville Formation. Zone IA. *Amplexus*, *Lophophyllum?*, *Syringopora*, *Vesiculophyllum?*.
- U-20. Broad Canyon, sec. 23, T. 1 N., R. 6 W., Tooele County (R. C. Gutschick, unpublished data, 1977). Lodgepole Limestone, Deseret Limestone, Great Blue Limestone(?). Zones IB, IC, IIA, IIB, IIID, IV. *Amplexizaphrentis*, *Amplexocarina*, *Canadiphyllum*, *Cleistopora*, *Cyathaxonia*, *Ekvasophyllum*, *Faberophyllum*, *Guerichophyllum*, *Lophophyllum?*, *Metriophyllum*, *Michelinia*, *Palaeacis*, *Siphonodendron*, *Siphonophyllia*, *Sychnoelasma*, *Syringopora*, *Vesiculophyllum*.
- U-21. Silveropolis Hill, sec. 30, T. 5 S., R. 3 W., and sec. 25, T. 5 S., R. 4 W., Tooele County (Mackenzie Gordon, Jr., unpublished data, 1962). Great Blue Limestone. Zones IV, VA, VB. *Amplexizaphrentis*, *Canadiphyllum*, *Clisiophyllum*, *Faberophyllum*, *Pleurosiphonella*, *Rotiphyllum*, *Siphonophyllia*.
- U-22. Cedar Valley Hills, secs. 29, 32, T. 6 S., R. 1 W., Utah County (R. C. Gutschick, unpublished data, 1976, 1977). Deseret Limestone. Zone IIID. *Canadiphyllum*, *Ekvasophyllum*, *Hapsiphyllum*, *Palaeacis*.
- U-23. Lakeside Mountains, secs. 6, 7, T. 1 N., R. 8 W., Tooele County (R. C. Gutschick, unpublished data, 1977). Lodgepole Limestone and Woodman Formation. Zone II. *Amplexizaphrentis*, *Cyathaxonia*, *Vesiculophyllum*.
- U-24. Big Canyon, secs. 32, 33, T. 6 S., R. 6 W., Tooele County (R. C. Gutschick, unpublished data, 1977). Humbug Formation(?). Zone IIID. *Ekvasophyllum*, *Siphonodendron*, *Stelechophyllum*.
- U-25. Samak, sec. 25, T. 2 S., R. 6 E., Summit County (see Dockal, 1980). Lodgepole Limestone and Brazer Dolomite. Zones II, IIIA. *Amplexizaphrentis*, *Amplexus*, *Ankhelasma?*, *Caninia*, *Cyathaxonia*, *Lophophyllum?*, *Michelinia*, *Rotiphyllum*, *Siphonodendron*, *Sychnoelasma*, *Syringopora*, *Vesiculophyllum*.
- U-26. Trail Hollow, sec. 33, T. 2 N., R. 9 W., Wasatch County (see Dockal, 1980). Brazer Dolomite. Zone IIIA. *Amplexizaphrentis*, *Ankhelasma*, *Caninia*, *Siphonodendron*, *Sychnoelasma*, *Syringopora*, *Vesiculophyllum*, *Zaphriphyllum*.
- U-27. Rhodes Canyon, sec. 3, T. 1 N., R. 9 W., Duchesne County (J. A. Dockal, unpublished data, 1976). Doughnut Formation. Zone VB. *Amplexizaphrentis*, *Michelinia*, *Multithecopora*, *Siphonophyllia*.
- U-28. Duchesne River, secs. 6, 7, T. 1 N., R. 8 W., Duchesne County (see Dockal, 1980). Lodgepole Limestone and Brazer Dolo-

mite. Zones II, IIIA. *Amplexizaphrentis*, *Lophophyllum*?, *Siphonodendron*, *Stelechophyllum*, *Sychnoelasma*, *Syringopora*, *Vesiculophyllum*.

- U-29. Whiterocks, sec. 1, T. 2 N., R. 1 W., and sec. 6, T. 2 N., R. 1 E., Uintah County (see Dockal, 1980). Lodgepole Limestone and Brazer Dolomite. Zone II. *Stelechophyllum*, *Sychnoelasma*, *Syringopora*, *Vesiculophyllum*.
- U-30. Little Brush Creek, sec. 24, T. 1 S., R. 21 E., and sec. 30, T. 1 S., R. 22 E., Uintah County (see Dockal, 1980). Lodgepole Limestone. Zone II. *Amplexizaphrentis*, *Michelinia*, *Sychnoelasma*, *Syringopora*, *Vesiculophyllum*.
- U-31. Holiday Park, sec. 35, T. 1 N., R. 9 E., Summit County (see Dockal, 1980). Lodgepole Limestone. Zone II. *Sychnoelasma*.
- U-32. East Fork of Black's Fork, sec. 24, T. 2 N., R. 13 E., Summit County (see Dockal, 1980). Lodgepole Limestone. Zone II. *Amplexizaphrentis*, *Sychnoelasma*.

WYOMING

- WY-1. Darby Canyon, secs. 14, 15, 23, T. 43 N., R. 118 W., Teton County (see Sando and Dutro, 1960). Lodgepole and Mission Canyon Limestones. Zones IB, IC, II. *Amplexizaphrentis*, *Amplexus*, *Cleistopora*, *Cyathaxonia*, *Guerichophyllum*, *Lophophyllum*?, *Michelinia*, *Neaxon*?, *Stelechophyllum*, *Sychnoelasma*, *Syringopora*, *Vesiculophyllum*.
- WY-2. Hoback Canyon, secs. 2, 3, T. 38 N., R. 115 W., Teton County (see Sando, 1977c; Sando, Bamber, and Armstrong, 1975). Mission Canyon Limestone and Amsden Formation. Zones II, IIIA. *Amplexizaphrentis*, "*Diphyphyllum*," *Duncanopora*, *Multihecopora*, *Rotiphyllum*?, *Siphonophyllia*, *Sychnoelasma*, *Syringopora*, *Turbinatocaninia*?, *Vesiculophyllum*.
- WY-3. Haystack Peak, sec. 19, T. 34 N., R. 117 W., Lincoln County (see Sando, 1977c; Sando, Bamber, and Armstrong, 1975). Lodgepole and Mission Canyon Limestones and Amsden Formation. Zones IB, IC, II, IIIA, VB. *Actinocyathus*, *Amplexizaphrentis*, *Amplexus*, *Ankhelesma*, *Canadiphyllum*?, *Caninia*, *Cyathaxonia*, *Duncanopora*, *Multihecopora*, *Pleurosiphonella*?, *Siphonodendron*, *Siphonophyllia*, *Stelechophyllum*, *Sychnoelasma*, *Syringopora*, "*Thysanophyllum*," *Turbinatocaninia*?, *Vesiculophyllum*, *Zaphriphyllum*.
- WY-4. Covey Cutoff Trail, sec. 27, T. 34 N., R. 117 W., Lincoln County (see Sando, Bamber, and Armstrong, 1975). Amsden Formation. Zone VB. *Actinocyathus*, *Duncanopora*, *Siphonophyllia*, *Turbinatocaninia*?
- WY-5. Moffat Trail, sec. 3, T. 33 N., R. 117 W., Lincoln County (see Sando, Bamber, and Armstrong, 1975). Amsden Formation. Zone VB. *Amplexizaphrentis*, *Duncanopora*, *Multihecopora*, *Pleurosiphonella*, *Siphonophyllia*, *Turbinatocaninia*?
- WY-6. South Indian Creek, sec. 14, T. 38 N., R. 118 W., Lincoln County (see Sando, Bamber, and Armstrong, 1975). Amsden Formation. Zone VB. *Duncanopora*, *Pleurosiphonella*, *Siphonophyllia*, *Turbinatocaninia*?
- WY-7. Soda Creek, sec. 5, T. 45 N., R. 110 W., Teton County (see Sando, Bamber, and Armstrong, 1975). Amsden Formation. Zone VA? *Amplexus*.
- WY-8. Horse Creek, sec. 19, T. 43 N., R. 106 W., Fremont County (see Sando, 1967, 1977c). Madison Limestone. Zones I, II, IIIA. "*Diphyphyllum*," *Lophophyllum*?, *Sychnoelasma*, *Syringopora*, *Zaphriphyllum*.
- WY-9. Wiggins Fork, sec. 7, T. 42 N., R. 105 W., Fremont County (see Sando, 1967). Madison Limestone. Zones II, IIIA. "*Diphyphyllum*," *Sychnoelasma*, *Syringopora*, *Vesiculophyllum*.
- WY-10. Warm Spring Canyon, sec. 31, T. 42 N., R. 107 W., Fremont County (see Sando, 1967, 1977c). Madison Limestone. Zones I, II, IIIA. *Amplexizaphrentis*, "*Diphyphyllum*," *Siphonodendron*, *Sychnoelasma*, *Syringopora*, *Vesiculophyllum*.
- WY-11. Dinwoody Canyon, secs. 1, 11, 12, T. 4 N., R. 6 W., Fremont County (see Sando, 1967). Madison Limestone. Zones I, II, IIIA. *Amplexizaphrentis*, "*Diphyphyllum*," *Lophophyllum*?, *Michelinia*, *Sychnoelasma*, *Syringopora*, *Vesiculophyllum*, *Zaphriphyllum*.
- WY-12. Bull Lake Creek, secs. 2, 3, T. 2 N., R. 4 W., Fremont County (see Sando, 1967). Madison Limestone. Zones I, II, IIIA. "*Diphyphyllum*," *Sychnoelasma*, *Syringopora*, *Vesiculophyllum*, *Zaphriphyllum*.
- WY-13. Washakie Reservoir, sec. 18, T. 1 S., R. 2 W., Fremont County (see Sando, 1967). Madison Limestone. Zones I, II, IIIA. *Amplexizaphrentis*, "*Diphyphyllum*," *Lophophyllum*?, *Sychnoelasma*, *Syringopora*, *Vesiculophyllum*, *Zaphriphyllum*.
- WY-14. Sinks Canyon, sec. 18, T. 32 N., R. 100 W., and sec. 24, T. 32 N., R. 101 W., Fremont County (see Sando, 1967). Madison Limestone. Zones II, IIIA. *Amplexizaphrentis*, "*Diphyphyllum*?", *Lophophyllum*?, *Michelinia*, *Sychnoelasma*, *Syringopora*, *Vesiculophyllum*.
- WY-15. Little Popo Agie, secs. 13 and 24, T. 31 N., R. 100 W., Fremont County (see Sando, 1967). Madison Limestone. Zone II. *Amplexizaphrentis*, *Sychnoelasma*, *Syringopora*, *Vesiculophyllum*.
- WY-16. Sweetwater Canyon, secs. 27, 34, T. 29 N., R. 97 W., Fremont County (see Sando, 1967). Madison Limestone. Zone II. *Syringopora*, *Vesiculophyllum*.
- WY-17. Clarks Fork Canyon, secs. 5, 6, 7, T. 56 N., R. 103 W., Park County (see Sando, 1975a). Madison Limestone. Zones I, II, IIIA. *Amplexizaphrentis*, "*Diphyphyllum*," *Lophophyllum*?, *Stelechophyllum*, *Syringopora*, *Vesiculophyllum*.
- WY-18. Shoshone Canyon, secs. 4 and 5, T. 52 N., R. 102 W., Park County (see Sando, 1975a). Madison Limestone. Zones I, II, IIIA. "*Diphyphyllum*," *Stelechophyllum*, *Sychnoelasma*, *Syringopora*, *Vesiculophyllum*.
- WY-19. Red Creek, sec. 28, T. 8 N., R. 1 E., Hot Springs County (see Sando, 1967). Madison Limestone. Zones I, II, IIIA. "*Diphyphyllum*," *Sychnoelasma*, *Syringopora*, *Vesiculophyllum*.
- WY-20. Wind River Canyon, sec. 4, T. 6 N., R. 6 E., Hot Springs County (see Sando, 1967). Madison Limestone. Zones I, II, IIIA. *Syringopora*, *Vesiculophyllum*.
- WY-21. Brown Spring Draw, sec. 35, T. 41 N., R. 92 W., Hot Springs County (W. J. Sando, unpublished data, 1965). Madison Limestone. Zones I, II. *Lophophyllum*?, *Syringopora*, *Vesiculophyllum*.
- WY-22. Sheep Mountain, sec. 35, T. 54 N., R. 94 W., and sec. 2, T. 53 N., R. 94 W., Big Horn County (W. J. Sando, unpublished data, 1966). Madison Limestone. Zones II, IIIA. *Sychnoelasma*, *Syringopora*, *Vesiculophyllum*.
- WY-23. Cottonwood Canyon, secs. 33, 34, T. 57 N., R. 93 W., Big Horn County (W. J. Sando, unpublished data, 1966). Madison Limestone. Zones I, II, IIIA. *Amplexizaphrentis*, "*Diphyphyllum*," *Lophophyllum*?, *Sychnoelasma*, *Syringopora*, *Vesiculophyllum*.
- WY-24. Shell Canyon, secs. 9, 17, T. 53 N., R. 90 W., Big Horn County (W. J. Sando, unpublished data, 1966). Madison Limestone. Zones I, II, IIIA. *Lophophyllum*?, *Syringopora*, *Vesiculophyllum*.

- WY-25. Paintrock Creek, sec. 20, T. 50 N., R. 88 W., and secs. 25 and 26, T. 50 N., R. 89 W., Big Horn County (W. J. Sando, unpublished data, 1966). Madison Limestone. Zones I, IIIA. "*Diphyphyllum*," *Pleurosiphonella*, *Syringopora*, *Vesiculophyllum*.
- WY-26. Tensleep Canyon, sec. 27, T. 48 N., R. 87 W., Washakie County (W. J. Sando, unpublished data, 1965). Madison Limestone. Zones I, II, IIIA. *Amplexus*?, "*Diphyphyllum*," *Lophophyllum*?, *Syringopora*, *Vesiculophyllum*.
- WY-27. Little Bighorn Canyon, sec. 20, T. 58 N., R. 89 W., Sheridan County (see Sando, 1976b). Madison Limestone. Zone II. *Lophophyllum*?, *Sychnoelasma*, *Syringopora*, *Vesiculophyllum*.
- WY-28. Little Tongue River, secs. 15, 26, 27, T. 56 N., R. 87 W., Sheridan County (see Sando, 1976b). Madison Limestone. Zones II, IIIA. "*Diphyphyllum*," *Sychnoelasma*, *Syringopora*, *Vesiculophyllum*.
- WY-29. Wolf Creek, sec. 5, T. 55 N., R. 86 W., Sheridan County (W. J. Sando, unpublished data, 1966). Madison Limestone. Zone IIIA. "*Diphyphyllum*," *Syringopora*.
- WY-30. Big Goose Creek, secs. 2, 3, T. 54 N., R. 86 W., and sec. 35, T. 55 N., R. 86 W., Sheridan County (see Sando, 1976b). Madison Limestone. Zones I, II. *Lophophyllum*?, *Sychnoelasma*, *Syringopora*, *Vesiculophyllum*.
- WY-31. South Rock Creek, sec. 25, T. 52 N., R. 84 W., Johnson County (see Sando, 1976b). Madison Limestone. Zones I, II. *Syringopora*, *Vesiculophyllum*.
- WY-32. North Crazy Woman Creek, secs. 27, 28, T. 49 N., R. 83 W., Johnson County (see Sando, 1976b). Madison Limestone. Zones I, II, IIIA. "*Diphyphyllum*," *Syringopora*, *Vesiculophyllum*.
- WY-33. Middle Buffalo Creek, secs. 20, 21, T. 40 N., R. 86 W., Natrona County (see Sando, 1976b). Madison Limestone. Zone II. *Sychnoelasma*, *Syringopora*, *Vesiculophyllum*.
- WY-34. Blue Creek, sec. 3, T. 42 N., R. 85 W., Johnson County (see Sando, 1976b). Madison Limestone. Zones I, II. *Sychnoelasma*?, *Syringopora*, *Vesiculophyllum*.
- WY-35. Cottonwood Creek, secs. 27, 34, T. 27 N., R. 88 W., Carbon County (M. W. Reynolds, unpublished data, 1968). Madison Limestone. Zone II. *Syringopora*, *Vesiculophyllum*.
- WY-36. Casper Mountain, secs. 8, 9, T. 32 N., R. 79 W., Natrona County (W. J. Sando, unpublished data, 1974). Madison Limestone. Zone IIIA. *Lophophyllum*?, *Vesiculophyllum*.

LOCALITIES NOT REPRESENTED BY MEASURED SECTIONS

ARIZONA

- A-9. Grand Wash Cliffs, sec. 2, T. 30 N., R. 16 W., Mohave County (report on shipment 0-60-55). Redwall Limestone. Zone II. *Amplexizaphrentis*, *Syringopora*, *Vesiculophyllum*.
- A-10. New Water Spring, west of Hualapai Indian Reservation and north of Diamond Bar Ranch (report on shipment 0-60-55). Redwall Limestone. Zone II. *Amplexizaphrentis*, *Cyathaxonia*, *Michelinia*, *Vesiculophyllum*.
- A-13. Tonto Basin dam site, Gila County (Ransome, 1917). Redwall Limestone. Zone II. *Amplexizaphrentis*, *Caninia*, *Michelinia*, *Sychnoelasma*, *Syringopora*, *Vesiculophyllum*.

- A-16. Queen Creek mine, Superior, Florence quadrangle, Pinal County (USGS loc. 9156-PC). Redwall Limestone. Zone I. *Amplexizaphrentis*, *Lophophyllum*?, *Syringopora*.

CALIFORNIA

- CA-6. Santa Rosa Hills, in T. 17 S., R. 40 E., Inyo County (reports on shipments MD-52-15 and MD-52-29). Tin Mountain Limestone and Perdido Formation or Lee Flat Limestone. Zones II, IIID. *Acrocarythus*, *Amplexizaphrentis*, *Canadiphyllum*?, *Caninia*?, *Ektasophyllum*?, *Lophophyllum*?, *Siphonodendron*, *Syringopora*, "*Thysanophyllum*," *Vesiculophyllum*.
- CA-7. Lost Burro, northeast corner of Ubehebe Peak quadrangle, Inyo County (report on shipment MD-54-15 and USGS loc. 24353-PC and 24354-PC). Tin Mountain Limestone. Zone II. *Caninia*?, *Cyathaxonia*, *Lophophyllum*?, *Syringopora*.
- CA-8. Argus Range, southwest corner of Panamint Butte quadrangle, Inyo County (reports on shipments MD-56-1M and MD-56-77). Tin Mountain Limestone. Zone II. *Amplexizaphrentis*, *Guerichophyllum*, *Sychnoelasma*, *Syringopora*, *Vesiculophyllum*.
- CA-9. Towne Pass, crest of Panamint Range, Inyo County (reports on shipments MD-56-1M and MD-56-77). Tin Mountain Limestone. Zone II. *Amplexizaphrentis*, *Amplexus*, *Caninia*, *Cyathaxonia*, *Lophophyllum*?, *Stelechophyllum*, *Sychnoelasma*, *Syringopora*, *Vesiculophyllum*.
- CA-10. Lake Hill, Panamint Butte quadrangle, Inyo County (reports on shipments MD-56-1M, MD-56-77, and MD-57-31). Tin Mountain Limestone. Zone II. *Amplexizaphrentis*, *Beaumontia*?, *Caninia*, *Cyathaxonia*, *Lophophyllum*?, *Stelechophyllum*, *Sychnoelasma*, *Syringopora*, *Vesiculophyllum*.
- CA-11. Tucki Mountain, sec. 24, T. 16 S., R. 45 E., Inyo County (reports on shipments GG-58-3D, GG-60-7, and PC-61-2). Tin Mountain Limestone. Zone II. *Beaumontia*, *Cyathaxonia*, *Lophophyllum*?, *Sychnoelasma*, *Syringopora*, *Vesiculophyllum*.
- CA-12. Tucki Mountain, sec. 31, T. 16 S., R. 45 E., Inyo County (report on shipment PC-61-2). Perdido Formation. Zone IIID?. *Canadiphyllum*?
- CA-13. Quartz Spring area, Panamint Range, Inyo County (McAllister, 1952). Tin Mountain Limestone and Perdido Formation. Zones I, II, IIID?. *Amplexus*, *Canadiphyllum*?, *Cyathaxonia*, *Sychnoelasma*, *Syringopora*, *Vesiculophyllum*.
- CA-14. Rest Spring Gulch, Quartz Spring area, Inyo County (Tischler, 1956, and USGS loc. 17668-PC, 17669-PC, 17675-PC). Perdido Formation. Zone III?. *Amplexizaphrentis*, *Canadiphyllum*?, *Cyathaxonia*, *Michelinia*, *Neaxon*?
- CA-15. Unnamed locality, about 2.5 mi N. 70 W. from northeast corner of Panamint Butte quadrangle, Inyo County (report on shipment MD-58-26). Tin Mountain Limestone. Zone II?. *Syringopora*.
- CA-16. Hill 2997, southeast end of Funeral Mountains, Ryan quadrangle, Inyo County (report on shipments LM-64-1 and GG-58-3). Tin Mountain Limestone. Zone II?. *Cyathaxonia*, *Lophophyllum*?, *Syringopora*.
- CA-17. Knob 4756, Ash Meadows quadrangle, Inyo County (report on shipment GG-58-3). Tin Mountain Limestone. Zone II?. *Amplexus*?, *Cyathaxonia*, *Vesiculophyllum*.
- CA-18. Lemoigne Canyon, 1.5 mi N. 38 E. of Lemoigne mine, Inyo County (report on shipment MD-58-26). Tin Mountain Limestone. Zone II?. *Caninia*, *Syringopora*.

COLORADO

IDAHO

- C-1. Tincup, Mt. Harvard quadrangle, Gunnison County (report on shipment SR-63-3). Leadville Limestone. Zone II. *Lophophyllum?*, *Sychnoelasma*, *Syringopora*, *Vesiculophyllum*.
- C-2. Rico, Rico District, Rico quadrangle, Dolores County (report on shipment MD-57-41). Leadville Limestone. Zone II. *Sychnoelasma*, *Vesiculophyllum*.
- C-3. Durango, 12.5 mi north of town at switchback in Highway 550, La Plata County (see Sando, 1972a). Leadville Limestone. Zone II. *Amplexizaphrentis?*, *Sychnoelasma*, *Vesiculophyllum*.
- C-4. Cement Creek, Crested Butte quadrangle, Gunnison County (see Girty, 1903). Leadville Limestone. Zone II. *Sychnoelasma*, *Syringopora*, *Vesiculophyllum*.
- C-5. Monarch, east side of trail to town, below office, Chaffee County (see Girty, 1903). Leadville Limestone. Zone II?. *Syringopora*.
- C-6. Unnamed locality, sec. 18, T. 10 S., R. 84 W., Pitkin County (USGS locs. 8464-PC, 19484-PC). Leadville Limestone. Zone II. *Sychnoelasma*, *Vesiculophyllum*.
- C-7. Unnamed locality, sec. 28, T. 7 S., R. 83 W., Eagle County (USGS loc. 8458-PC). Leadville Limestone. Zone II. *Sychnoelasma*, *Syringopora*, *Vesiculophyllum*.
- C-8. Express Creek, sec. 32, T. 11 S., R. 84 W., Pitkin County (USGS locs. 8460-PC, 8462-PC, 8463-PC, 8466-PC, 8468-PC, 8474-PC). Leadville Limestone. Zone II. *Siphonodendron?*, *Sychnoelasma*, *Syringopora*, *Vesiculophyllum*.
- C-9. Lime Creek, at mouth of creek where it meets Frying Pan River, Mt. Jackson quadrangle, Pitkin County (USGS loc. 8470-PC). Leadville Limestone. Zone II. *Vesiculophyllum*.
- C-10. Meredith quarry, sec. 14, T. 8 S., R. 83 W., Pitkin County (USGS loc. 8473-PC). Leadville Limestone. Zone II. *Sychnoelasma*, *Vesiculophyllum*.
- C-11. Duncan Hill, Garfield quadrangle, Gunnison County (USGS locs. 19339-PC, 19489-PC, 19490-PC). Leadville Limestone. Zone II. *Amplexizaphrentis*, *Sychnoelasma*, *Syringopora*, *Vesiculophyllum*.
- C-12. Cascade Creek, about 0.5 mi below bridge on Silverton Road, San Juan County (see Sando, 1972a). Leadville Limestone. Zone II. *Sychnoelasma*, *Vesiculophyllum*.
- C-13. Coalbank Hill, Engineer Mountain quadrangle, San Juan County (see Sando, 1972a). Leadville Limestone. Zone II. *Sychnoelasma*.
- C-14. Canyon Creek, Needle Mountains quadrangle, La Plata County (see Sando, 1972a). Leadville Limestone. Zone II. *Sychnoelasma*.
- C-15. Rockwood, near town, Durango quadrangle, La Plata County (see Sando, 1972a). Leadville Limestone. Zone II. *Amplexizaphrentis*, *Sychnoelasma*, *Vesiculophyllum*.
- C-16. Uncompaghe River, 4,000 ft southeast of Canyon Creek, Ouray County (Sando, 1972a). Leadville Limestone. Zone II. *Sychnoelasma*, *Syringopora*, *Vesiculophyllum*.
- C-17. Silverton, east side of wagon road, 2.5 mi south of town, San Juan County. Leadville Limestone. Zone II. *Vesiculophyllum*.
- C-18. Irish Canyon, sec. 27, T. 10 N., R. 101 W., Moffat County (USGS locs. 5117-PC, 5117a-PC, 5117b-PC). Madison Limestone. Zone II. *Amplexizaphrentis*, *Cyathaxonia?*, *Sychnoelasma*, *Syringopora*, *Vesiculophyllum*.
- I-1. Unnamed locality, sec. 31, T. 4 N., R. 27 E., Butte County (report on shipment CEG-77-3). Unnamed unit above Surret Canyon Formation. Zone VI?. *Amplexizaphrentis*.
- I-2. Unnamed locality, sec. 33, T. 6 N., R. 27 E., Butte County (report on shipment CEG-75-18). Scott Peak and Surret Canyon Formations. Zones IV, V. *Amplexizaphrentis*.
- I-3. Unnamed locality, secs. 5, 8, 9, T. 5 N., R. 28 E., and secs 32, 33, T. 6 N., R. 28 E., Butte County (report on shipment CEG-76-1). Scott Peak and Surret Canyon Formations. Zones IV, V. *Amplexizaphrentis*, *Faberophyllum*, *Multithecopora*, "*Pseudodorlodotia*", *Siphonodendron*, *Siphonophyllia*.
- I-4. Unnamed locality, sec. 5, T. 5 N., R. 27 E., and sec. 6, T. 6 N., R. 27 E., Butte County (report on shipment CEG-76-1). Scott Peak and Surret Canyon Formations. Zones IV, V. *Amplexizaphrentis*, *Faberophyllum*, *Siphonophyllia*.
- I-5. Unnamed locality, sec. 11, T. 7 N., R. 29 E., Butte County (report on shipment CEG-76-1). Scott Peak Formation. Zone IV. *Faberophyllum*.
- I-6. Unnamed locality, sec. 19, T. 7 N., R. 29 E., Butte County (report on shipment CEG-76-1). Scott Peak and Surret Canyon Formations. Zones IV, V., *Faberophyllum*, "*Pseudodorlodotia*", *Siphonophyllia*.
- I-7. Unnamed locality, sec. 7, T. 7 N., R. 29 E., Butte County (report on shipment CEG-76-1). Scott Peak Formation. Zone IIID. *Ekvasophyllum*.
- I-8. Unnamed locality, secs. 20, 29, T. 5 N., R. 24 E., Custer County (reports on shipments CEG-73-7 and CEG-73-13). Scott Peak and Surret Canyon Formations. Zones IV, V. *Duncanopora*, *Pleurosiphonella*, *Schoenophyllum*, *Siphonophyllia*.
- I-9. Unnamed locality, sec. 3, T. 11 N., R. 32 E., Clark County (report on shipment CEG-74-7). McGowan Creek Formation. Zone II?. *Rotiphyllum*.
- I-10. Unnamed locality, sec. 30, T. 9 N., R. 32 E., Clark County (report on shipment CEG-74-7). Scott Peak Formation. Zone IV. *Faberophyllum*, *Siphonodendron*.
- I-11. Unnamed locality, sec. 11, T. 11 N., R. 32 E., Clark County (report on shipment CEG-74-7). Scott Peak Formation. Zones IIID, IV. *Ekvasophyllum*, *Faberophyllum*, *Pleurosiphonella*.
- I-12. Unnamed locality, secs. 5, 6, 7, T. 11 N., R. 32 E., Clark County (report on shipment CEG-74-7). Scott Peak Formation. Zones IIID, IV. *Canadiphyllum*, *Ekvasophyllum*, *Faberophyllum*, *Pleurosiphonella*.
- I-13. Unnamed locality, sec. 12, T. 13 N., R. 32 E., Clark County (report on shipment CEG-74-7). Scott Peak Formation. Zone IV. *Clisiophyllum*, *Faberophyllum*.
- I-14. Unnamed locality, sec. 25, T. 10 N., R. 31 E., Clark County (report on shipment CEG-74-7). Surret Canyon Formation. Zone V. *Michelinia?*.
- I-15. Unnamed locality, secs. 3, 11, T. 4 N., R. 24 E., Butte County (report on shipment CEG-73-13). Scott Peak and Surret Canyon Formations. Zones IV, V. *Faberophyllum*, *Siphonophyllia*.
- I-16. Unnamed locality, sec. 7, T. 3 N., R. 24 E., Butte County (report on shipment CEG-73-13). Scott Peak Formation?. Zone IV. *Amplexizaphrentis?*.
- I-17. Unnamed locality, sec. 5, T. 2 N., R. 24 E., Butte County (report on shipment CEG-73-13). Surret Canyon Formation. Zone V. *Siphonophyllia*.

- I-18. Unnamed locality, sec. 7, T. 4 S., R. 37 E., Bingham County (report on shipment NR-66-6). Monroe Canyon Limestone? Zone IV. *Faberophyllum*.
- I-19. Unnamed locality, sec. 30, T. 4 S., R. 37 E., Bingham County (report on shipment NR-66-6). Monroe Canyon Limestone? Zone IV. *Faberophyllum*.
- I-20. Bannock Peak, secs. 27, 28, 33, 34, T. 9 S., R. 35 E., Power County (report on shipment EG-58-9). Lodgepole Limestone. Zone II. *Amplexizaphrentis*, *Michelinia*, *Palaeacis*, *Sychnoelasma*, *Vesiculophyllum*.
- I-21. Unnamed locality, sec. 5, T. 9 S., R. 33 E., Power County (report on shipment EG-58-2). Lodgepole Limestone. Zone II. *Sychnoelasma*, *Vesiculophyllum*.
- I-22. Unnamed locality, sec. 21, T. 5 S., R. 35 E., Power County (report on shipment EG-58-2). Lodgepole Limestone. Zone II. *Amplexizaphrentis*?, *Sychnoelasma*.
- I-23. Unnamed locality, sec. 36, T. 8 S., R. 33 E., Power County (report on shipment EG-58-2). Great Blue Limestone. Zone IV. *Faberophyllum*.
- I-24. Unnamed locality, secs. 25, 30, 36, T. 17 N., R. 26 E., Lemhi County (report on shipments NR-64-6 and NR-61-24). Scott Peak Formation? Zones IV, V. *Dorlodotia*?, *Ekvasophyllum*?, *Faberophyllum*, *Pleurosiphonella*, *Schoenophyllum*.
- I-25. Broken Wagon Creek, sec. 25, T. 11 N., R. 20 E., Custer County (report on shipment CEG-74-2). Scott Peak Formation? Zone IV. *Faberophyllum*, "*Pseudodorlodotia*."
- I-26. Unnamed locality, sec. 15, T. 6 N., R. 30 E., Butte County (report on shipment WR-52-18). Scott Peak Formation? Zone IIID. "*Diphyphyllum*."
- I-27. Unnamed locality, sec. 9, T. 12 N., R. 19 E., Custer County (report on shipment CEG-72-13D). Unknown formation. Zone indeterminate. *Caninia*, *Siphonodendron*.
- I-28. Peck's Canyon, secs. 19, 30, T. 9 N., R. 21 E., Custer County (report on shipments 0-72-30 and 0-72-82). Scott Peak(?) and Surret Canyon(?) Formations. Zones IV, V. *Amplexizaphrentis*, *Faberophyllum*, *Multithecopora*, *Schoenophyllum*, *Siphonodendron*, *Siphonophyllia*, "*Thysanophyllum*."
- I-29. Unnamed locality, sec. 22, T. 11 N., R. 16 E., Custer County (report on shipment RME-71-1). McGowan Creek Formation? Zone indeterminate. *Amplexizaphrentis*?
- I-30. Unnamed locality, sec. 13, T. 16 N., R. 43 E., Fremont County (report on shipment NR-67-3). Amsden Formation? Zone indeterminate. *Amplexizaphrentis*.
- I-31. Montpelier, sec. 15, T. 13 S., R. 44 E., Bear Lake County (report on shipment NR-65-6D). Little Flat Formation? Zone IIID. *Canadiphyllum*, *Ekvasophyllum*?
- I-32. Unnamed locality, secs. 26, 32, 35, 36, T. 9 S., R. 39 E., Bannock and Caribou Counties (report on shipment NR-62-9). Lodgepole Limestone, Little Flat Formation, and Monroe Canyon Limestone. Zones II, IIID, IV. *Acrocyathus* (cerioid), *Amplexizaphrentis*, *Dorlodotia*?, *Ekvasophyllum*, *Faberophyllum*, *Palaeacis*, *Petalaxis*, *Sychnoelasma*, *Syringopora*, *Vesiculophyllum*.
- I-33. Unnamed locality, secs. 7, 12, 13, T. 16 N., R. 27 E., Lemhi County (report on shipment MD-60-13). Lodgepole Limestone and Scott Peak Formation? Zones II, IV. *Amplexizaphrentis*, *Faberophyllum*, *Lophophyllum*?, *Sychnoelasma*, *Syringopora*, *Vesiculophyllum*.
- I-34. Unnamed locality, 43°35' N., 111°20' W., Bonneville County (report on shipment CD-60-6). Lodgepole and Mission Canyon Limestones. Zone II. *Stelechophyllum*, *Sychnoelasma*, *Syringopora*, *Vesiculophyllum*.
- I-35. Unnamed locality, sec. 20, T. 7 S., R. 44 E., Caribou County (report on shipment CD-59-2). Monroe Canyon Limestone? Zone IV. *Faberophyllum*, *Multithecopora*, *Pleurosiphonella*, "*Pseudodorlodotia*."
- I-36. Unnamed locality, secs. 16, 17, 18, 29, T. 8 S., R. 41 E., Caribou County (report on shipment MD-57-44). Lodgepole and Monroe Canyon Limestones. Zones II, IV. *Faberophyllum*, *Michelinia*, *Pleurosiphonella*, *Siphonodendron*, *Stelechophyllum*, *Sychnoelasma*, *Syringopora*, *Vesiculophyllum*.
- I-37. Unnamed locality, sec. 11, T. 8 S., R. 40 E., Bannock County (report on shipment MD-57-44). Lodgepole Limestone. Zone II. *Sychnoelasma*.
- I-38. Dry Ridge, sec. 36, T. 9 S., R. 44 E., Caribou County (report on shipment MD-52-24). Monroe Canyon Limestone. Zones IIID, IV. *Clisiophyllum*, "*Diphyphyllum*," "*Ekvasophyllum*," *Faberophyllum*, *Multithecopora*.
- I-39. Unnamed locality, sec. 22, T. 8 N., R. 26 E., Butte County (report on shipment NR-64-14). Scott Peak Formation. Zone IIID. *Acrocyathus*, *Pleurosiphonella*, *Siphonodendron*.
- I-40. Unnamed locality, secs. 2, 3, 11, 12, T. 3 S., R. 39 E., Bingham County (Sando, 1965). Monroe Canyon Limestone. Zone IIID? *Sciophyllum*.

MONTANA

- M-1. Unnamed locality, sec. 36, T. 1 S., R. 10 W., Beaverhead County (report on shipment EGM-75-1). Lodgepole Limestone. Zone II. *Sychnoelasma*, *Vesiculophyllum*.
- M-2. Little Blackfoot River, sec. 29, T. 11 N., R. 6 W., Lewis and Clark County (report on shipment 0-63-66). Madison Limestone? Zone IIIA. *Ankhelasma*, *Vesiculophyllum*.
- M-3. Canyon Creek (report on shipment EGM-73-1). Mission Canyon Limestone. Zone II. *Lophophyllum*?, *Sychnoelasma*, *Syringopora*, *Vesiculophyllum*.
- M-4. Stockette, 0.25 mi north of town, Cascade County (report on shipment 0-66-27). Mission Canyon Limestone. Zone IIIA? *Vesiculophyllum*.
- M-5. Unnamed locality, sec. 12, T. 15 N., R. 9 E., Judith Basin County (report on shipment NR-65-2). Lodgepole Limestone. Zone II. *Amplexizaphrentis*, *Caninia*, *Lophophyllum*?, *Sychnoelasma*, *Stelechophyllum*.
- M-6. Unnamed locality, secs. 7, 17, T. 15 N., R. 10 E., Judith Basin County (report on shipment NR-65-2). Lodgepole Limestone. Zone II. *Amplexizaphrentis*, *Cyathaxonia*, *Lophophyllum*?, *Stelechophyllum*, *Sychnoelasma*, *Syringopora*, *Vesiculophyllum*.
- M-7. Unnamed locality, secs. 22, 27, T. 15 N., R. 9 E., Judith Basin County (report on shipment NR-65-2). Lodgepole Limestone. Zone II. *Amplexizaphrentis*, *Amplexus*, *Cyathaxonia*, *Lophophyllum*?, *Sychnoelasma*, *Syringopora*, *Vesiculophyllum*.
- M-8. The Arch and Mixes Baldy, secs. 9, 21, 22, 33, T. 16 N., R. 9 E., Judith Basin County (report on shipment NR-64-15). Lodgepole Limestone. Zone II. *Cyathaxonia*, *Michelinia*, *Stelechophyllum*, *Sychnoelasma*, *Syringopora*, *Vesiculophyllum*.
- M-9. Paddy's Run, secs. 29, 36, T. 6 N., R. 5 E., Gallatin and Meagher Counties (report on shipment NR-64-2). Lodgepole and Mission Canyon Limestones. Zone II. *Amplexus*, *Rotiphyllum*?, *Sychnoelasma*, *Syringopora*, *Vesiculophyllum*.
- M-10. Unnamed locality, sec. 17, T. 5 N., R. 6 E., Broadwater County (report on shipment NR-63-3D). Lodgepole Limestone. Zone IC. *Amplexizaphrentis*, *Amplexus*, *Cyathaxonia*, *Rotiphyllum*.

- M-11. Wall Mountain, sec. 10, T. 5 N., R. 5 E., Broadwater County (report on shipment NR-63-3D). Lodgepole Limestone. Zones IC, II. *Amplexizaphrentis*, *Amplexus*, *Caninia*, *Lophophyllum*?, *Sychnoelasma*, *Vesiculophyllum*.
- M-12. Wolf Creek, sec. 23, T. 16 N., R. 5 W., Lewis and Clark County (report on shipment G and P-59-3). Lodgepole Limestone. Zone II. *Lophophyllum*?
- M-13. Swift Reservoir, sec. 29, T. 28 N., R. 10 W., Pondera County. Castle Reef Dolomite?. Zone IIIA. "*Diphyphyllum*," *Siphonodendron*, *Stelechophyllum*?, *Vesiculophyllum*.
- M-14. Unnamed locality, sec. 12, T. 2 N., R. 1 E., Gallatin County (report on shipment GG-53-10D). Madison Limestone. Zone II. *Sychnoelasma*.
- M-15. Unnamed locality, sec. 36, T. 3 N., R. 1 E., Broadwater County (report on shipment GG-53-10D). Lodgepole Limestone. Zone II. *Sychnoelasma*.
- M-16. Shell Mountain, T. 3 S., R. 11 E., Park County (report by Helen Duncan to Paul Richards, January 27, 1950). Lodgepole Limestone. Zone II. *Lophophyllum*?, *Stelechophyllum*, *Sychnoelasma*, *Syringopora*, *Vesiculophyllum*.
- M-17. Devils Lane, 1.5 mi southeast of Crockett Lake, Varney quadrangle, Madison County (same report as M-16). Mission Canyon Limestone. Zone IIIA. *Amplexizaphrentis*, "*Diphyphyllum*," *Syringopora*, *Vesiculophyllum*.
- M-18. Beaver Creek, sec. 34, T. 21 N., R. 9 W., Lewis and Clark County (report on shipment EG-58-10). Allan Mountain Limestone. Zone IC. *Cyathaxonia*, *Guerichophyllum*, *Neaxon*?
- N-11. Indian Springs, sec. 31, T. 16 S., R. 56 E., Clark County (report on shipment SP-65-7). Bird Spring Formation. Zone V. *Amplexizaphrentis*.
- N-12. Enright Hill, sec. 8, T. 46 N., R. 55 E., Elko County (report on shipment SW-62-23). Banner Formation. Zone IIID. *Acroclyathus* (cerioid), *Canadiphyllum*, *Multithecopora*, *Siphonodendron*.
- N-13. Unnamed locality, on road from Newark Summit to Pinto Creek Ranch, Pinto Summit quadrangle, White Pine County (report on shipment SW-69-11). Diamond Peak Formation. Zone V. *Amplexizaphrentis*?, *Michelinia*.
- N-14. Diamond Peak, southwest shoulder, Eureka quadrangle, Eureka County (report on shipment SW-69-11). Diamond Peak Formation. Zone V. *Amplexizaphrentis*.
- N-15. Spring Canyon, sec. 11, T. 32 N., R. 53 E., Elko County (report on shipment SW-67-1). Diamond Peak Formation. Zone IV. *Faberophyllum*.
- N-16. Dixie Creek, sec. 24, T. 32 N., R. 54, Elko County (report on shipment SW-67-1). Diamond Peak Formation. Zone V. *Amplexizaphrentis*.
- N-17. Unnamed locality, secs. 9, 11, T. 45 N., R. 53 E., Elko County (reports on shipments MD-57-38 and SW-67-2). Banner Formation. Zone IIID. *Canadiphyllum*, *Dorlodotia*?, *Ekvasophyllum*?, *Siphonodendron*.
- N-18. Black Point, sec. 12, T. 16 N., R. 54 E., White Pine County (report on shipment SW-68-2). Joana Limestone. Zone I?. *Cyathaxonia*?
- N-19. Pancake Range, sec. 26, T. 17 N., R. 55 E., White Pine County (reports on shipments SW-66-20 and SW-68-2). Joana Limestone. Zone I. *Cyathaxonia*, *Lophophyllum*?, *Michelinia*, *Syringopora*.
- N-20. Secret Canyon, sec. 31, T. 18 N., R. 54 E., Eureka County (report on shipment SW-68-2). Diamond Peak Formation. Zone V. *Faberophyllum*.
- N-21. Pogues Hill, sec. 17, T. 15 N., R. 55 E., White Pine County (reports on shipments SW-69-12 and SW-61-40). Chainman Shale. Zone IIID?. *Amplexizaphrentis*, *Ekvasophyllum*?, *Rhopalolasma*.
- N-22. Schell Creek Range, sec. 16, T. 11 N., R. 65 E., White Pine County (report on shipment SW-68-1). Joana Limestone. Zone II. *Michelinia*, *Vesiculophyllum*.
- N-23. Grant Range, sec. 33, T. 9 N., R. 50 E., Nye County (report on shipment SW-65-13). Joana Limestone. Zone II. *Sychnoelasma*, *Vesiculophyllum*.
- N-24. Unnamed locality, secs. 25, 36, T. 20 S., R. 62 E., Clark County (report on shipments HM-66-4 and SP-66-1). Unnamed formation. Zone IC or II. *Amplexizaphrentis*, *Cyathaxonia*, *Lophophyllum*?, *Michelinia*, *Rotiphyllum*, *Vesiculophyllum*.
- N-25. Mountain Springs, sec. 19, T. 22 S., R. 58 E., Clark County (report on shipment SP-66-1). Monte Cristo Limestone. Zone IIID?. *Acroclyathus* (cerioid), *Canadiphyllum*, *Dorlodotia*?
- N-26. Carlin Canyon, sec. 21, T. 33 N., R. 53 E., Elko County (report on shipment GG-58-19). "Tonka Formation." Zone II. *Amplexizaphrentis*, *Cyathaxonia*.
- N-27. Newark Mountain, canyon near southwest edge of mountain, Eureka quadrangle, Eureka County (report on shipment SW-66-20). "White Pine Shale." Zone II?. *Amplexizaphrentis*?
- N-28. Quartzite Mountain, Tippipah Spring NE quadrangle, Nye County (report on shipment SP-64-4). Eleana Formation. Zone III?. *Amplexizaphrentis*, *Amplexus*, *Cyathaxonia*.

NEVADA

- N-29. Grouse Canyon, Tippipah Spring NW quadrangle, Nye County (report on shipment SP-64-4). Eleana Formation. Zone IV. *Cyathaxonia*, *Faberophyllum*.
- N-30. Frenchman Flat, Cane Springs NE quadrangle, Nye County (report on shipment SP-64-4). Eleana Formation. Zone V. *Amplexizaphrentis*.
- N-31. Narrow Canyon, Mercury NE quadrangle, Nye County (report on shipment SP-64-4). Mercury Limestone. Zone II?. *Lophophyllum*?, *Syringopora*, *Vesiculophyllum*.
- N-32. Unnamed locality, 10 mi north of Tonopah, Nye County (report on shipment SW-63-2). Unnamed formation. Zone III. *Siphonodendron*.
- N-33. Big Spring, sec. 18, T. 9 N., R. 55 E., Nye County (report on shipment SW-63-17). Joana Limestone. Zone II?. *Cyathaxonia*, *Syringopora*.
- N-34. Unnamed locality, sec. 17, T. 6 N., R. 59 E., Nye County (reports on shipments SW-62-7 and SW-61-8). Joana Limestone. Zone II. *Amplexizaphrentis*, *Amplexus*, *Cyathaxonia*, *Lophophyllum*?, *Vesiculophyllum*.
- N-35. Diamond Peak, sec. 12, T. 20 W., R. 54 E., Eureka County (report on shipment SW-61-10). Diamond Peak Formation. Zone III. *Amplexizaphrentis*, *Cyathaxonia*, *Siphonodendron*.
- N-36. Seaman Range, north end, Lund quadrangle, Nye County (report on shipment SW-63-7). Joana Limestone. Zone II. *Sychnoelasma*, *Vesiculophyllum*.
- N-37. Unnamed locality, sec. 34, T. 4 N., R. 60 E., Nye County (report on shipment SW-62-7). Joana Limestone. Zone II. *Sychnoelasma*, *Vesiculophyllum*.
- N-38. Cooper Canyon, secs. 20, 28, T. 15 N., R. 65 E., White Pine County (report on shipment SW-61-4). Joana Limestone. Zone II. *Amplexizaphrentis*, *Stelechophyllum*, *Sychnoelasma*, *Vesiculophyllum*.
- N-39. Unnamed locality, sec. 32, T. 27 N., R. 53 E., Elko County (report on shipment GG-56-10). Unnamed formation. Zone II?. *Syringopora*.
- N-40. Unnamed locality, sec. 35, T. 19 S., R. 59 E., Clark County (report on shipment GG-58-21). Monte Cristo Limestone. Zone IIIA. "*Diphyphyllum*," *Syringopora*, *Vesiculophyllum*.
- N-41. Unnamed locality, sec. 5, T. 28 N., R. 54 E., Elko County (report on shipment GG-57-12). Unnamed formation. Zone IV?. *Faberophyllum*?
- N-42. Unnamed locality, sec. 13, T. 19 S., R. 56 E., Clark County (report on shipment 0-55-26). Dawn Limestone [Member of Monte Cristo Limestone]. Zone II. *Sychnoelasma*.
- N-43. Deer Creek Basin, sec. 18, T. 19 S., R. 57 E., Clark County (report on shipment 0-55-26). Unnamed formation. Zone II. *Sychnoelasma*.
- N-44. Pahroc Range, sec. 26, T. 5 N., R. 62 E., Lincoln County (report on shipment MD-56-65). Unnamed formation. Zone II?. *Sychnoelasma*?, *Vesiculophyllum*?
- N-45. South Schell Creek Range, sec. 13, T. 5 N., R. 63 E., Lincoln County (report on shipment MD-56-65). Unnamed formation. Zone II. *Stelechophyllum*, *Sychnoelasma*, *Vesiculophyllum*.
- N-46. Unnamed locality, secs. 11, 22, 27, 28, T. 38 N., R. 41 E., Humboldt County (reports on shipments MD-52-18, 52-23, 50-13, and 51-26). Goughs Canyon Formation. Zone III. *Amplexizaphrentis*, *Canadiphyllum*, *Cyathaxonia*, *Lophophyllum*?, *Michelinia*, *Neaxon*?, *Rhopalolasma*, *Siphonodendron*, *Syringopora*.
- N-47. Dutch John Mountain, secs. 3, 10, T. 6 N., R. 65 E., Lincoln County (see Stensaas and Langenheim, 1960). Bristol Pass Limestone. Zone II. *Stelechophyllum*, *Vesiculophyllum*.
- N-48. Unnamed locality, sec. 26, T. 15 N., R. 62 E., White Pine County (see Stensaas and Langenheim, 1960). Joana Limestone. Zone II. *Stelechophyllum*, *Vesiculophyllum*.
- N-49. Unnamed locality, sec. 33, T. 10 N., R. 63 E., White Pine County (see Stensaas and Langenheim, 1960). Joana Limestone. Zone II. *Stelechophyllum*.
- N-50. Unnamed locality, sec. 33, T. 10 N., R. 63 E., White Pine County (see Stensaas and Langenheim, 1960). Joana Limestone. Zone II. *Stelechophyllum*, *Vesiculophyllum*.
- N-51. Unnamed locality, sec. 1, T. 14 N., R. 62 E., White Pine County (see Stensaas and Langenheim, 1960). Joana Limestone. Zone II. *Stelechophyllum*, *Vesiculophyllum*.
- N-52. Unnamed locality, secs. 16, 21, T. 23 S., R. 58 E., Clark County (see Hewett, 1931). Monte Cristo Limestone. Zone II. *Amplexizaphrentis*, *Sychnoelasma*, *Vesiculophyllum*.
- N-53. Unnamed locality, sec. 34, T. 23 S., R. 57 E., Clark County (see Hewett, 1931). Monte Cristo Limestone. Zone II. *Amplexizaphrentis*, *Cyathaxonia*, *Lophophyllum*?, *Sychnoelasma*.
- N-54. Unnamed locality, sec. 1, T. 24 S., R. 57 E., Clark County (USGS locality 4293-PC). Monte Cristo Limestone. Zone II?. *Lophophyllum*?, *Michelinia*, *Sychnoelasma*, *Syringopora*, *Vesiculophyllum*.
- N-55. Unnamed locality, secs. 5, 8, 9, 31, 33, T. 24 S., R. 58 E., Clark County (see Hewett, 1931). Monte Cristo Limestone. Zone IIIA. *Caninia*, "*Diphyphyllum*," *Siphonodendron*, *Syringopora*, *Vesiculophyllum*.
- N-56. Unnamed locality, secs. 2, 19, 23, 34, T. 25 S., R. 58 E., Clark County (see Hewett, 1931). Monte Cristo Limestone. Zones II, IIIA. "*Diphyphyllum*," *Stelechophyllum*, *Sychnoelasma*, *Syringopora*, *Vesiculophyllum*.
- N-57. West Range, Bristol Pass quadrangle, Lincoln County (see Westgate and Knopf, 1932). Bristol Pass Limestone. Zone II. *Amplexus*?, *Sychnoelasma*, *Syringopora*, *Vesiculophyllum*.
- N-58. Valley Ridge and Green Monster mine, secs. 1, 8, T. 24 S., R. 56 E., Clark County (see Hewett, 1956). Monte Cristo Limestone. Zones II, IIIA. *Amplexizaphrentis*, *Caninia*, "*Diphyphyllum*," *Lophophyllum*?, *Syringopora*.
- N-59. North slope of Dutch John Mountain, 40 mi northeast of Pioche, Lincoln County (see Westgate and Knopf, 1932). Bristol Pass Limestone. Zone II. *Amplexizaphrentis*, *Stelechophyllum*, *Sychnoelasma*, *Syringopora*, *Vesiculophyllum*.
- N-60. Unnamed locality, sec. 18, T. 16 N., R. 63 E., White Pine County. Joana Limestone. Zone II. *Michelinia*.
- N-61. Unnamed locality, Owyhee quadrangle, Elko County (report on shipment MD-59-25). Banner Formation. Zone IIID. *Canadiphyllum*, *Siphonodendron*.
- N-62. Unnamed locality, Wheeler Peak quadrangle, White Pine County (report on shipment MD-59-3). Joana Limestone. Zone II. *Cleistopora*, *Stelechophyllum*, *Syringopora*.

SOUTH DAKOTA

- SD-1. Unnamed locality, ridge northwest of Deadwood, Sturgis quadrangle, Lawrence County (USGS loc. 1899-PC). Pahasapa Limestone. Zone II. *Syringopora*.
- SD-2. Unnamed locality, east side of Whitewood Creek Canyon, Sturgis quadrangle, Lawrence County (USGS locs. 4325-PC, 4326-PC). Pahasapa Limestone. Zone II. *Syringopora*, *Vesiculophyllum*.
- SD-3. Unnamed locality, west slope of Crook Mountain, Sturgis quadrangle, Lawrence County (USGS loc. 4328-PC). Pahasapa Limestone. Zone II. *Syringopora*.

- SD-4. Meadow Creek, Sturgis quadrangle, Lawrence County (USGS locs. 4334-PC, 4337-PC). Pahasapa Limestone. Zone II. *Syringopora*, *Vesiculophyllum*.
- SD-5. Runkel, Sturgis quadrangle, Meade County (USGS locs. 4339-PC, 4340-PC, 4347-PC, 4350-PC). Pahasapa Limestone. Zone II. *Syringopora*, *Vesiculophyllum*?
- SD-6. Pillar Peak, Sturgis quadrangle, Lawrence County (USGS loc. 4341-PC). Pahasapa Limestone. Zone II. *Syringopora*.
- SD-7. Bear Butte Canyon and Butcher Gulch, Sturgis quadrangle, Lawrence County (USGS locs. 4342-PC, 4343-PC). Pahasapa Limestone. Zone II. *Amplexizaphrentis*, *Syringopora*.
- SD-8. Whiterock, east of Deadwood, Sturgis quadrangle, Lawrence County (USGS loc. 4344-PC). Pahasapa Limestone. Zone II. *Lophophyllum*?
- SD-9. Tollgate Flats, Spearfish quadrangle, Lawrence County (USGS loc. 4348-PC). Pahasapa Limestone. Zone II. *Vesiculophyllum*.
- SD-10. Terry Peak, Spearfish quadrangle, Lawrence County (USGS loc. 4349-PC). Pahasapa Limestone. Zone II. *Syringopora*.
- SD-11. Unnamed locality, sec. 19, T. 4 N., R. 3 E., Lawrence County (USGS locs. 5704-PC, 5704a-PC, 5704b-PC, 5704d-PC). Pahasapa Limestone. Zone II. *Lophophyllum*?, *Syringopora*, *Vesiculophyllum*?
- SD-12. Unnamed locality, sec. 16, T. 1 N., R. 1 E., Pennington County (report on shipment NR-65-6). Pahasapa Limestone. Zone II. *Syringopora*, *Vesiculophyllum*.
- SD-13. Unnamed locality, sec. 33, T. 3 N., R. 1 E., Lawrence County (report on shipment NR-65-6). Pahasapa Limestone. Zone II. *Vesiculophyllum*.

UTAH

- U-1. Unnamed locality, sec. 19, T. 9 N., R. 1 E., Cache County (report on shipment WMR-76-1M). Deseret Limestone or Humbug Formation. Zone IIID. *Ekvasophyllum*, *Siphonodendron*.
- U-2. Unnamed locality, secs. 2, 24, 31, 35, 36, T. 9 N., R. 1 W., Box Elder County (report on shipment WMR-76-1M). Gardison Limestone and Humbug Formation. Zones II, IV. *Cleistopora*, *Cyathaxonia*, *Faberophyllum*, *Lophophyllum*?, *Sychnoelasma*, *Vesiculophyllum*.
- U-3. Unnamed locality, secs. 28, 29, T. 6 N., R. 9 W., Box Elder County (report on shipment 0-75-5). Great Blue Limestone and Humbug Formation? Zone IV. *Faberophyllum*.
- U-4. Unnamed locality, sec. 16, T. 1 N., R. 8 W., Tooele County (report on shipment 0-75-5). Great Blue Limestone. Zone IV. *Faberophyllum*.
- U-5. Unnamed locality, secs. 4 and 15, T. 3 S., R. 4 E., Wasatch County (report on shipments RMM-71-1 and RMM-71-2). Gardison Limestone and Brazer Dolomite(?). Zones II, IIIA. *Amplexizaphrentis*, *Lophophyllum*?, *Siphonodendron*, *Sychnoelasma*, *Syringopora*, *Vesiculophyllum*.
- U-6. Unnamed locality, sec. 14, T. 14 S., R. 16 W., Juab County (report on shipment WMR-72-4). Joana Limestone. Zone II. *Stelechophyllum*, *Sychnoelasma*, *Syringopora*, *Vesiculophyllum*.
- U-7. Unnamed locality, sec. 3, T. 3 S., R. 4 E., Wasatch County (report on shipment RMM-71-1). Gardison Limestone. Zone II. *Syringopora*.
- U-8. Unnamed locality, sec. 11, T. 2 N., R. 18 E., Daggett County (reports on shipments 0-65-23 and CD-66-5). Madison Limestone and Doughnut Formation. Zones II, V. *Amplexizaphrentis*, *Sychnoelasma*, *Syringopora*.
- U-9. Unnamed locality, secs. 1, 10, 13, T. 7 N., R. 3 E., Weber County (reports on shipments CD-67-1 and CD-69-5). Humbug Formation. Zone IV. *Amplexizaphrentis*, *Faberophyllum*, *Siphonodendron*.
- U-10. Unnamed locality, secs. 34 and 35, T. 13 S., R. 3 W., and sec. 2, T. 14 S., R. 3 W., Juab County (report on shipment BFM-68-1). Gardison Limestone and Humbug Formation. Zones II, IIID. *Acroclyathus*? (cerioid), *Canadiphyllum*, *Ekvasophyllum*, *Pleurosiphonella*, *Sychnoelasma*, *Syringopora*, *Vesiculophyllum*.
- U-11. Beirdneau Peak, secs. 11, 14, T. 12 N., R. 2 E., Cache County (report on shipment 0-65-23). Lodgepole Limestone and "Brazer Limestone." Zones II, IIID. *Siphonodendron*, *Sychnoelasma*.
- U-12. Smith and Morehouse Canyon, T. 1 S., R. 7 E., Summit County (report on shipment 0-65-23). Madison Limestone. Zone II. *Amplexizaphrentis*, *Sychnoelasma*.
- U-13. Duchesne River, T. 1 N., R. 8 W., Duchesne County (report on shipment 0-65-23). Madison Limestone. Zone II. *Lophophyllum*?, *Vesiculophyllum*.
- U-14. Deadman Pass, sec. 33, T. 2 N., R. 11 E., Summit County (report on shipment 0-65-23). Madison Limestone. Zone II. *Sychnoelasma*, *Vesiculophyllum*.
- U-15. Promontory Range, Box Elder County (report on shipment 0-58-32). Madison Limestone, Humbug Formation, and Great Blue Limestone. Zones II, IIID, IV. *Dorlodotia*?, *Ekvasophyllum*, *Faberophyllum*, *Lophophyllum*?, *Pleurosiphonella*, *Sychnoelasma*, *Vesiculophyllum*.
- U-16. Unnamed locality, sec. 28, T. 18 S., R. 16 W., Millard County (report on shipment F-59-2). Joana Limestone. Zone II. *Amplexizaphrentis*, *Stelechophyllum*, *Syringopora*, *Vesiculophyllum*?
- U-17. Unnamed locality, north end of Beaver Lake Mountains, Beaver County (report on shipment 0-58-26). "Topache Limestone"? Zone II? *Vesiculophyllum*.
- U-18. Unnamed locality, sec. 24, T. 4 S., R. 2 E., Utah County (report on shipment MD-54-10). Deseret Limestone. Zone III. *Cyathaxonia*?, *Michelinia*.
- U-19. Unnamed locality, sec. 35, T. 23 S., R. 18 W., Millard County (report on shipment 0 and G-77-5). Chainman Shale. Zone V. *Amplexizaphrentis*, *Barytichisma*?, *Michelinia*.
- U-20. Unnamed locality, secs. 30, 31, T. 1 S., R. 24 E., Uintah County (see Kinney, 1955). Madison Limestone. Zone II. *Michelinia*, *Sychnoelasma*, *Syringopora*, *Vesiculophyllum*.
- U-21. Unnamed locality, sec. 30, T. 10 N., R. 2 E., Cache County (Sando, 1983). Monroe Canyon Limestone. Zone IIID. *Acroclyathus* (cerioid).
- U-22. Paradise Canyon, sec. 5 or 6, T. 9 N., R. 2 E., Cache County (Sando, 1983). Monroe Canyon Limestone. Zone IV. *Petalaxis*.
- U-23. East Canyon, sec. 7, T. 9 N., R. 2 E., Cache County (Sando, 1983). Monroe Canyon Limestone. Zone VA. *Schoenophyllum*.

WYOMING

- WY-1. Unnamed locality, sec. 8, T. 45 N., R. 104 W., Park and Fremont Counties (report on shipment EEG-76-31). Madison

- Limestone. Zone II. *Lophophyllum?*, *Sychnoelasma?*, *Vesiculophyllum*.
- WY-2. Crowfoot Ridge and Bighorn Pass, Yellowstone Park (report on shipment NR-67-2). Madison Limestone. Zone II. *Cleistopora*, *Sychnoelasma*, *Syringopora*, *Vesiculophyllum*.
- WY-3. Bannock Peak, 44°53'N. 110°52.5'W., Mt. Holmes quadrangle, Yellowstone Park (report on shipment NR-68-1). Lodgepole and Mission Canyon Limestones. Zone II. *Amplexizaphrentis*, *Sychnoelasma*, *Vesiculophyllum*.
- WY-4. Unnamed locality, secs. 12, 18, T. 42 N., R. 115 W., Teton County (report on shipment RME-69-6). Madison Limestone. Zone II. *Caninia*, *Lophophyllum?*, *Syringopora*.
- WY-5. Unnamed locality, sec. 3, T. 42 N., R. 118 W., Teton County (report on shipment CD-66-1). Mission Canyon Limestone? Zone IIIA. "*Diphyphyllum*."
- WY-6. Unnamed locality, secs. 11, 24, 27, T. 41 N., R. 118 W., Teton County (report on shipment CD-66-1). Mission Canyon Limestone. Zones II, IIIA. "*Diphyphyllum*," *Lophophyllum?*, *Vesiculophyllum*.
- WY-7. Unnamed locality, sec. 11, T. 42 N., R. 115 W., Teton County (report on shipment NR-63-17D). Unnamed formation. Zone I or II. *Lophophyllum?*.
- WY-8. Unnamed locality, sec. 30, T. 38 N., R. 118 W., Lincoln County (report on shipment CD-63-10). Lodgepole Limestone. Zone II. *Sychnoelasma*, *Vesiculophyllum*.
- WY-9. Unnamed locality, sec. 28, T. 45 N., R. 60 W., Weston County (report on shipment MD-57-21D). Pahasapa Limestone. Zone II. *Syringopora*, *Vesiculophyllum*.
- WY-10. Unnamed locality, sec. 9, T. 28 N., R. 92 W., Fremont County (report on shipment F-54-7D). Madison Limestone. Zone II?. *Syringopora*.
- WY-11. Darby Mountain, sec. 8, T. 29 N., R. 115 W., Sublette County (report on shipment from P. E. Cloud, July 2, 1955). Mission Canyon Limestone. Zone II. *Sychnoelasma*, *Syringopora*, *Vesiculophyllum*.
- WY-12. Unnamed locality, sec. 29, T. 43 N., R. 106 W., Fremont County (report on shipment F-53-33). Madison Limestone. Zone IIIA. "*Diphyphyllum*," *Siphonodendron*, *Syringopora*, *Vesiculophyllum*, *Zaphriphyllum*.
- WY-13. Waterdog Lake, sec. 15, T. 38 W., R. 111 W., Sublette County (report on shipment F-55-19). Madison Limestone. Zone IIIA. *Syringopora*, *Vesiculophyllum*, *Zaphriphyllum*.
- WY-14. Unnamed locality, sec. 19, T. 41 N., R. 114 W., Teton County (report on shipment F-53-43). Madison Limestone. Zone II. *Stelechophyllum*.
- WY-15. Unnamed locality, sec. 3, T. 49 N., R. 83 W., Johnson County (report on shipment F-50-34). Madison Limestone. Zone II?. *Syringopora*.
- WY-16. Cherry Creek, secs. 19, 30, T. 31 N., R. 99 W., Fremont County (see Sando, 1975b). Amsden Formation. Zone VI. *Barytichisma*.

CANADA

The following list includes (1) localities represented by detailed measured sections (in plate captions, referred to as "sections") and (2) localities not represented by such sections (in plate captions, referred to as "localities"). The list is based mainly on data from internal Geological Survey of Canada (GSC) biostratigraphic reports by Bamber but also includes in-

formation from many publications on the Mississippian of western Canada. Geographic location, published or unpublished references, GSC locality numbers (where applicable), stratigraphic level, coral zones identified, and coral genera present are given for each locality.

DETAILED MEASURED SECTIONS

SOUTHWEST DISTRICT OF MACKENZIE

- SWDM-1. Sheaf Creek, 61°12'23"N., 124°33'32"W. (GSC internal report), all measurements above base of Flett Formation. *Amplexizaphrentis*, GSC locs. C-52462, C-52463, 786 to 837 ft, Zone IIIB (foraminiferal Zone 12); "*Diphyphyllum*," GSC loc. C-47942, 1,014 ft, Zone IIID; *Ekvasophyllum*, GSC locs. C-52472, C-52485, 917 to 1,081 ft, Zone IIIB or IIIC, IIID; *Siphonodendron*, GSC locs. C-47942, C-52479, C-52489, C-52490, 963 to 1,122 ft, Zone IIIB or IIIC, IIID; *Syringopora*, GSC loc. C-47492, 1,014 ft, Zone IIID.
- SWDM-2. Twisted Mountain, 61°11'N., 123°27'38"W. (GSC internal report), all measurements above base of Flett Formation. *Amplexizaphrentis*, GSC locs. C-59036, C-59040, 284 to 289 ft, Zone IIIA; *Caninia*, GSC loc. C-59049, 627 ft, Zone IIIB; *Siphonodendron*, GSC locs. C-59028, C-59036, C-59049, 155 to 627 ft, Zones IIB?, IIIA, IIIB; *Lophophyllum?*, GSC locs. C-59039, C-59043, C-59049, 280 to 627 ft, Zone IIIA, IIIB; *Vesiculophyllum*, GSC loc. C-59043, 323 to 337 ft, Zone IIIA; *Zaphriphyllum*, GSC locs. C-59039, C-59040, C-59043, 280 to 337 ft, Zone IIIA.
- SWDM-3. North end Mattson anticline, 61°06'38"N., 123°45'54"W. (GSC internal report), all measurements above base of Flett Formation. *Amplexizaphrentis*, GSC locs. C-47925, C-52234, C-52239, 80 to 1,123 ft, Zones IIB, IIIA, IIIB; "*Diphyphyllum*," GSC loc. C-52268, 1,504 to 1,513 ft, Zone IIIC or lower Zone IIID (foraminiferal Zone 13); *Siphonodendron*, GSC locs. C-47929, C-47930, C-47933, C-52205, C-52238, 443 to 1,095 ft, Zone IIIA, IIIB; *Lophophyllum?*, GSC locs. C-47948, C-52234, C-52239, C-52240, 1,041 to 1,394 ft, Zone IIIB, IIIC, or lower IIID (foraminiferal Zone 13); *Syringopora*, GSC loc. C-52268, 1,504 to 1,513 ft, Zone IIIC or lower IIID (foraminiferal Zone 13); *Vesiculophyllum*, GSC locs. C-47926, C-47929, C-52238, 517 to 1,095 ft, Zone IIIA, IIIB; *Zaphriphyllum*, GSC locs. C-47928 to C-47930, 717 to 1,077 ft, Zone IIIA, IIIB.
- SWDM-4. Jackfish Gap, type section of Flett Formation, 61°05'54"N., 123°59'26"W. (see Bamber and Mamet, 1978), all measurements above base of Flett Formation. *Amplexizaphrentis*, GSC locs. C-52108, C-52111, C-52534, C-52538, C-52541, C-52544, C-52545, C-52549, 68813, 68819, 68820, 267 to 1,437 ft, Zones IIB? (foraminiferal Zone 9?), IIIA, IIIB, IIIC, IIID; "*Diphyphyllum*," GSC locs. C-52124, C-52546, 1,140 to 1,248 ft, Zone IIIB?; *Ekvasophyllum*, GSC locs. C-47950, C-52113, C-52119, C-52543, C-52544, C-52546, 68816, 68820, 965 to 1,437 ft, Zone IIIA, IIIB, IIIC, IIID; *Liaridiphyllum*, GSC locs. 68811, 68817, 782 and 1,273 ft, Zone IIIA, IIIC; *Siphonodendron*, GSC locs. 68814,

- 68816, 68889, 928 to 1,336 ft, Zone IIIA, IIIB?, IIID; *Lophophyllum*?, GSC locs. C-52126, C-52157, C-52538, 68803, 68806, 68811, 68813, 380 to 1,552 ft, Zones IIB, IIIA, IIIB, IIID; *Syringopora*, GSC locs. C-52120, C-52546, 68802, 304 to 1,248 ft, Zones IIB, IIIB?, IIIC or IIID; *Vesiculophyllum*, GSC locs. C-47950, C-52087, 68804, 432 to 625 ft, Zones IIB, IIIA; *Zaphriphyllum*, GSC locs. C-47950, C-52541, 625 to 658 ft, Zone IIIA.
- SWDM-5. Flett Mountain, west of Liard River at Flett Rapids, 60°42'N., 123°37'W. (see Sutherland, 1958, section 11, fossil localities 37, 38, p. 34, 40). *Amplexizaphrentis*, *Lophophyllum*?, GSC loc. 16605, unit 5, section 11, upper Flett Formation, Zone IIIA or IIIB; *Siphonodendron*, GSC loc. 16606, unit 5, section 11, upper Flett Formation, Zone IIIA or IIIB.
- SWDM-6. Sawmill Mountain, exact location of collecting locality in doubt, approximately 60°38'N., 123°40'W. (see Sutherland, 1958, section 11, fossil locality 40, p. 34, 40). *Ekvasophyllum*, GSC loc. 16627, unit 4, section 11, middle Flett Formation, Zone IIIA.
- SWDM-7. West flank Flett anticline, 60°33'50"N., 123°48'20"W. (GSC internal report), all measurements above base of Flett Formation. *Amplexizaphrentis*, GSC locs. C-47938, C-52396, 722 to 932 ft, Zone IIB (foraminiferal Zone 9); *Siphonodendron*, GSC loc. C-47941, 1,391 to 1,394 ft, Zone IIID; *Stelechophyllum*, GSC loc. C-52434, 994 ft, Zone IIID.
- SWDM-8. Liard Range, 5 mi west of Liard River, 60°29'46"N., 123°38'53"W. (GSC internal report), all measurements above base of Flett Formation. *Siphonodendron*, GSC locs. C-52361, 68829, 1,117 to 1,392 ft, Zone IIIC?, IIID; *Stelechophyllum*, GSC locs. 68829, 1,388 to 1,392 ft, Zone IIID.
- SWDM-9. Liard Range South, 5 mi west of Liard River at Big Island, 60°29'N., 123°38'W. (see Sutherland, 1958, section 11, fossil localities 30, 32, p. 34, 39). *Amplexizaphrentis*, GSC loc. 16617, unit 6, section 11, upper Flett Formation, Zone IIIC or IIID; *Vesiculophyllum*, GSC loc. 16615, unit 5, section 11, upper Flett Formation, Zone IIIB or IIIC.
- SWDM-10. Liard River area, 2 mi west of Liard River at Big Island, 60°29'N., 123°33'30"W. (see Sutherland, 1958, section 11, fossil localities 28, 29, p. 34, 39). *Amplexizaphrentis*, *Ekvasophyllum*, *Liardiphyllum*, *Lophophyllum*?, *Zaphriphyllum*, GSC loc. 16622, upper 60 ft of unit 4, section 11, middle Flett Formation, Zone IIIA.
- NEBC-3. Imperial Sikanni Chief (1) b-92-D/94-I-4, subsurface (see Bamber and Mamet, 1978), *Ekvasophyllum*?, GSC loc. 55794, 237 ft below top of lower Debolt Formation, Zone IIIA; *Siphonodendron*, GSC loc. 43420, 242 ft below top of lower Debolt Formation, Zone IIIA; *Vesiculophyllum*, GSC loc. 43429, 108 ft below top of Shunda Formation, Zone IIB.
- NEBC-4. HB-Imperial-Union Paddy (1) a-49-B/94-H-16, subsurface (see Bamber and Mamet, 1978), all measurements below top of Debolt Formation, Zone IIIA. *Siphonodendron*, *Vesiculophyllum*, GSC loc. 43509, 277 ft; *Zaphriphyllum*, GSC loc. 43512, 282 ft.
- NEBC-5. West Canadian Lily Lake c-81-F/94-G-2, subsurface (see Bamber and Mamet, 1978), all measurements below top of Debolt Formation, Zone IIID. *Amplexizaphrentis*, GSC loc. 59375, 685 ft; *Ekvasophyllum*, GSC locs. 59358, 59376, 566 to 575 ft; *Siphonodendron*, GSC locs. 59359, 59364, 59366, 59367, 59379, 513 to 572 ft; *Lophophyllum*?, GSC loc. 59371, 105 ft; *Stelechophyllum*, GSC locs. 59362, 59368, 59377, 115 to 203 ft; *Syringopora*, GSC locs. 59366, 59376, 59379, 545 to 567 ft; *Zaphriphyllum*, GSC loc. 59372, 681 ft.
- NEBC-6. Pacific Highway (2) a-47-I/94-B-16, subsurface (see Bamber and Mamet, 1978), all measurements below top of Debolt Formation, Zone IIIC or lower IIID (foraminiferal Zone 13). *Lophophyllum*?, GSC locs. 43446, 43452, 43453, 54 to 337 ft; *Siphonodendron*, GSC loc. 43447, 310 ft; *Syringopora*, GSC loc. 43454, 309 ft.
- NEBC-7. Pacific Highway (1) b-25-I/94-B-16, subsurface (see Bamber and Mamet, 1978), all measurements below top of lower Debolt Formation, Zone IIIB. *Amplexizaphrentis*, GSC locs. 43355, 43371, 43375, 43391, 50 to 134 ft; *Caninia*, GSC locs. 43370, 43387, 45 to 55 ft; *Koninckophyllum*?, GSC loc. 43384, 39 ft; *Siphonodendron*, GSC locs. 43355, 43357, 43361, 43363, 43379, 43387, 55 to 245 ft; *Lophophyllum*?, GSC locs. 43361, 43374, 43378, 72 to 188 ft; *Syringopora*, GSC locs. 43357, 43359, 43375, 77 to 105 ft; *Vesiculophyllum*, GSC locs. 43357, 43360, 43367, 43368, 43370, 43371, 43380, 43384, 24 to 81 ft; *Zaphriphyllum*, GSC locs. 43350, 43357 to 43359, 43366, 43370, 43379, 43386, 45 to 245 ft.
- NEBC-8. Pacific Highway (3) a-69-I/94-B-16, subsurface (see Bamber and Mamet, 1978). *Ekvasophyllum*, GSC locs. 43393, 43400, 65.5 to 83 ft below top of lower Debolt Formation, Zone IIIB; *Siphonodendron*, GSC locs. 43394, 43409, 75 to 110 ft below top of lower Debolt Formation, Zone IIIB; *Lophophyllum*?, GSC loc. 43399, 93 ft below top of Debolt Formation, Zone IIID? (foraminiferal Zone 13 upper); *Syringopora*, GSC locs. 43402, 43405, 43406, 87 ft below top of lower Debolt Formation to 95.5 ft below top of Debolt Formation, Zone IIIB, IIID; *Vesiculophyllum*, GSC locs. 43395, 43401, 43407, 40 to 88 ft below top of lower Debolt Formation, Zone IIIB; *Zaphriphyllum*, GSC locs. 43397, 43414, 43417, 44038, 70 to 93 ft below top of lower Debolt Formation, Zone IIIB.
- NEBC-9. West Nat. Gundy Creek b-69-A/94-B-16, subsurface (see Bamber and Mamet, 1978), all measurements below top of Debolt Formation, Zone IIID. *Ekvasophyllum*, GSC locs. 43497, 43501, 52 to 84 ft; *Siphonodendron*, GSC loc. 43490, 52 to 56 ft; *Syringopora*, GSC locs. 43496, 43502, 50.5 to 53 ft.

NORTHEASTERN BRITISH COLUMBIA

- NEBC-10. West Nat. et al. Blueberry c-65-D/94-A-13, subsurface (see Bamber and Mamet, 1978). *Siphonodendron*, *Syringopora*, GSC loc. 55771, 33 ft below top of Debolt Formation, Zone IIID?
- NEBC-11. Decalta Blueberry d-57-D/94-A-13, subsurface (see Bamber and Mamet, 1978), all measurements below top of Debolt Formation. *Siphonodendron*, GSC locs. 70452 to 70454, 19 to 79 ft, Zone IIIA; *Lophophyllum?*, *Syringopora*, GSC loc. 70455, 117 ft, Zone IIIC or lower IIID.
- NEBC-12. West Nat. et al. Blueberry d-46-D/94-A-13, subsurface (see Bamber and Mamet, 1978). *Siphonodendron*, GSC loc. 55793, 51 to 56 ft below top of Debolt Formation, Zone IIID.
- NEBC-13. West Nat. et al. Blueberry (13) d-50-K/94-A-12, subsurface (see Bamber and Mamet, 1978), all measurements below top of Debolt Formation. *Siphonodendron*, GSC locs. 43471, 43472, 146 to 168 ft, Zone IIID; *Syringopora*, GSC locs. 43470, 43474, 145 to 161 ft, Zone IIID.
- NEBC-14. West Nat. et al. Bernadet 8-1-88-25W6, subsurface (see Bamber and Mamet, 1978), all measurements below top of Debolt Formation. *Siphonodendron*, GSC locs. 70446 to 70449, 266 to 288 ft, Zone IIID; *Lophophyllum?*, *Syringopora*, GSC loc. 70447, 267 ft, Zone IIID.
- NEBC-15. West Nat. et al. Halfway (3) 8-11-87-25W6, subsurface (see Bamber and Mamet, 1978). *Lophophyllum?*, GSC loc. 55787, 122 ft below top of Debolt Formation, Zone IIID? (foraminiferal Zone 13 or 14).
- NEBC-16. Texaco NFA Boundary Lake (1) 6-6-86-13W6, subsurface (see Bamber and Mamet, 1978). *Stelechophyllum?*, GSC loc. 55780, 24 ft below top of Debolt Formation, Zone IIID; *Syringopora*, GSC locs. 55777, 55778, 31 to 58 ft below top of Debolt Formation, Zone IIID.
- NEBC-17. South Chlotopecta Creek, 3½ mi south of Chlotopecta Creek, 58°27'N., 123°55'W., all measurements below top of Prophet Formation (GSC internal report), Zone IIIC or IIID (lower). *Canadiphyllum*, GSC locs. 66680, 66681, 66684, 66689, 43 to 195 ft; *Ekvasophyllum?*, GSC loc. 66682, 165 ft; *Stelechophyllum*, GSC loc. 66680, 192 to 195 ft.
- NEBC-18. Bat Creek (type section of Prophet Formation), cliffs north of Bat Creek waterfall, 57°47'N., 123°37'W. (see Bamber and Mamet, 1978), all measurements below top of Prophet Formation. *Acrocyathus?*, GSC loc. 66587, 1 to 15 ft, Zone IIID; *Amplexizaphrentis?*, GSC locs. 66584, 66589, 1 to 66 ft, Zone IIB? (foraminiferal Zone 9 or 10), IIID; *Canadiphyllum*, GSC locs. 16045, 66585, 66586, 66587, 1 to 195 ft, Zone IIIB?, IIID; *Ekvasophyllum*, GSC locs. C-11670, 66584, 66587, 1 to 50? ft, Zone IIID; *Siphonodendron*, GSC locs. 16030, 66588, 325 to 345 ft, Zone IIIB (foraminiferal Zone 12); *Stelechophyllum?*, GSC locs. 16034, 66584, 66586, 66587, 0 to 68 ft, Zone IIID.
- NEBC-19. Trimble Lake, 3.5 mi north of west end of Trimble Lake, 57°19'37"N., 123°43'30"W. (see Bamber and Mamet, 1978). *Ekvasophyllum*, GSC loc. 66524, 48 ft below top of Prophet Formation, Zone IIID or lower Zone IV (foraminiferal Zone 14?).
- NEBC-20. Trimble Lake East, 3 mi northeast of east end of Trimble Lake, 57°17'N., 123°31'W., all measurements below top of Prophet Formation (GSC internal report). *Acrocyathus?*, GSC locs. 66582, 66583, 5 to 14 ft, Zone IIID; *Canadiphyllum*, GSC locs. 66573, 66581, 16 to 509 ft, Zone IIIC?, IIID; *Ekvasophyllum*, GSC loc. C-11684, 30 ft, Zone IIID; *Siphonodendron*, GSC loc. 66579, 190 ft, Zone IIID; *Stelechophyllum*, GSC loc. 66582, 14 ft, Zone IIID.
- NEBC-21. Halfway River, north side of river valley, 56°59'N., 123°29'W. (see Sutherland, 1958, section 7, unit 6, p. 24, 40). *Canadiphyllum*, *Ekvasophyllum*, GSC loc. 16038, upper 20 ft of member B Prophet Fm., Zone IIIB or IIIC.
- NEBC-22. Halfway River South, 3 mi southwest of Halfway River, 56°54'N., 123°27'30"W.; corals from upper part of Prophet Formation, faulted section, footage uncertain (GSC internal report). *Ekvasophyllum*, GSC loc. C-11649, Zone IIID?, *Siphonodendron*, GSC loc. C-11647, Zone IIID.
- NEBC-23. Nabesche River, 24 mi north of Peace River, 56°20'N., 123°15'W. (see Bamber and Mamet, 1978), measurements below top of Prophet Formation, unless indicated otherwise. *Acrocyathus*, GSC loc. 66411, 327 to 333 ft, Zone IIID; *Amplexizaphrentis*, GSC locs. 66375, 66421, 9 to 2,360 ft, Zone IIIB, IIIC; *Canadiphyllum*, GSC locs. 66376, 66378 to 66380, 66388, 66389, 66391, 66401, 897 to 2,186 ft, Zone IIIB to IIID; "Diphyphyllum," GSC locs. 66391 to 66392, 66396, 66399, 66413, 238 to 1,456 ft, Zone IIIC, IIID; *Ekvasophyllum*, GSC locs. C-11554, C-11558, 66389, 66397, 66401 to 66403, 66405 to 66411, 66413, 66417 to 66420, 66422, 66427, 1,621 ft below top of Prophet Formation to 239 ft above base of Golata Formation, Zone IIID, lower Zone IV?; *Koninckophyllum*, GSC locs. C-11554, 66421, 9 to 10 ft, lower Zone IV?; *Siphonodendron*, GSC locs. C-11556, C-11562, C-11563, 66390, 66392, 66395, 66404, 66406, 66411, 327 to 1,597 ft, Zone IIID; *Stelechophyllum*, GSC locs. C-11557, C-11560, 66411, 170 to 333 ft, Zone IIID; *Zaphriphyllum*, GSC locs. 66376, 66378, 66380 to 66386, 66390, 66391, 66394, 66396, 1,351 to 2,186 ft, Zone IIIB, IIIC.
- NEBC-24. Mount Greene, east side of mountain, 56°05'N., 123°15'W. (GSC internal report). *Ekvasophyllum*, GSC locs. C-11806, C-11811, top of Prophet Formation to 475 ft below top, Zone IIID.
- NEBC-25. Peace River, 4 mi southwest of Mt. Greene, north side of Peace River, 56°02'N., 123°12'W., all measurements below top of Prophet Formation (GSC internal report). *Acrocyathus*, GSC loc. C-11741, 130 ft, Zone IIID; *Ekvasophyllum*, GSC loc. C-11738, 15 to 25 ft, Zone IIID; *Siphonodendron*, GSC loc. C-11752, 1,425 ft, Zone IIIC?; *Lophophyllum?*, GSC loc. C-11742, 160 ft, Zone IIID.
- NEBC-26. Clearwater Lake, 8 mi north-northwest of Clearwater Lake, 55°40'30"N., 122°57'W., all measurements below top of Prophet Formation, Zone IIIC (GSC internal report). *Canadiphyllum*, GSC loc. C-4532, 190 ft; *Ekvasophyllum*, GSC locs. C-4528 to C-4531, 196 to 320 ft; *Siphonodendron*, GSC loc. C-4530, 264.5 to 266 ft; *Lophophyllum?*, GSC loc. C-4531, 196 ft; *Stelechophyllum?*, GSC loc. C-4529, 303 to 309 ft.
- NEBC-27. Solitude Mountain, roadcut on Hart Highway at north end of Solitude Mountain, 55°30'30"N., 122°38'W., all measurements below top of Rundle Group, Zone IIIC (foraminiferal Zone 13) (GSC internal report). *Siphonodendron*, GSC locs. C-4513 to C-4517, 233 to 381 ft; *Michelinia*, GSC loc. C-4509, 79 ft; *Zaphriphyllum*, GSC locs. C-4507, C-4510, 25 to 149 ft.
- NEBC-28. Peck Creek, 1 mi northwest of headwaters of Peck Creek, 55°44.5'N., 122°56'W., all measurements below top of

- Prophet Formation (GSC internal report). *Acrocyathus*, GSC locs. C-4542, C-4544, C-4546, 20 to 82 ft, Zone IIID; *Ekuasophyllum*, GSC locs. C-4341, C-4543 to C-4545, 7 to 96 ft, Zone IIIC?, IIID; *Siphonodendron*, GSC loc. C-4544, 22 to 24 ft, Zone IIID; "*Thysanophyllum*," GSC loc. C-11666, top of Prophet Formation, Zone IIID.
- NEBC-29. East Mountain Creek, ridge 1.5 mi east of Mountain Creek, 55°23'N., 122°25'W., all measurements below top of Debolt Formation (GSC internal report). *Amplexizaphrentis*, GSC locs. C-4562, C-4565, C-4568, C-4572, 95 to 492 ft, Zone IIIA to IIIC; *Ankhelasma*, GSC locs. C-4562, C-4567, 364? to 492 ft, Zone IIIA; *Canadiphyllum*?, GSC loc. C-4570, 221 ft, Zone IIIB? (foraminiferal Zone 12); *Caninia*, GSC loc. C-4562, 492 ft, Zone IIIA; *Ekuasophyllum*, GSC locs. C-4558, C-4565, C-4573, 68 to 566 ft, Zone IIIA to IIIC; *Siphonodendron*, GSC locs. C-4561, C-4569, 353 to 526 ft, Zone IIIA, IIIB?; *Lophophyllum*?, GSC locs. C-4557 to C-4560, C-4562, 490 to 575 ft, Zone IIIA; *Vesiculophyllum*, GSC locs. C-4557 to C-4560, C-4566, 379 to 575 ft, Zone IIIA; *Zaphriphyllum*, GSC locs. C-4557, C-4558, 566 to 575 ft, Zone IIIA.
- NEBC-30. North Burnt River, 5 mi northwest of big bend of Burnt River, 55°14'30"N., 122°05'W. (GSC internal report). *Amplexizaphrentis*, GSC loc. C-4611, 296 to 311 ft above base of Shunda Formation, Zone IIB; *Aulostylus*, GSC loc. C-4603, 81 ft below top of Pekisko Formation, Zone IIB; *Siphonodendron*, GSC locs. C-4613 to C-4616, 214 to 387 ft above base of Debolt Formation, Zone IIIA; *Lophophyllum*?, GSC locs. C-4600, C-4604, C-4611, 161 ft below top of Pekisko Formation to 311 ft above base of Shunda Formation, Zone IIB; *Sychnoelasma*, GSC locs. C-4605 to C-4608, C-4610, 132 to 270 ft above base of Shunda Formation, Zone IIB; *Vesiculophyllum*, GSC locs. C-4600 to C-4602, C-4604, C-4605, C-4607, C-4610, C-4611, 161 ft below top of Pekisko Formation to 311 ft above base of Shunda Formation, Zone IIB; *Zaphriphyllum*, GSC locs. C-4600 to C-4602, C-4605, C-4611 to C-4613, 161 ft below top of Pekisko Formation to 214 ft above base of Debolt Formation.
- NEBC-31. Burnt River, 2 mi north of big bend in Burnt River, 55°12'N., 122°02'30"W. (GSC internal report). *Amplexizaphrentis*, GSC locs. C-4580 to C-4582, C-4585 to C-4587, C-4592, C-4593, C-4596, C-4598, 29 ft below top of Banff Formation to 358 ft above base of Debolt Formation, Zones IIB, IIIA; *Aulostylus*, GSC locs. C-11766, C-37921, Pekisko Formation?, Zone IIB; *Cyathaxonia*, GSC loc. C-4579, 38 to 41 ft below top of Banff Formation, Zone IIB?; *Koninckophyllum*, GSC loc. C-4595, 248 ft above base of Debolt Formation, Zone IIIA; *Lophophyllum*?, GSC locs. C-4580, C-4585, C-4586, C-4590, C-4599, 29 ft below top of Banff Formation to 381 ft above base of Debolt Formation, Zones IIB, IIIA; *Michelinia*, GSC locs. C-4582, C-4584, 13 to 105 ft above base of Pekisko Formation, Zone IIB; *Sychnoelasma*, GSC locs. C-4580, C-4583 to C-4585, C-4587, 29 ft below top of Banff Formation to 32 ft above base of Debolt Formation, Zones IIB, IIIA (basal) (foraminiferal Zone 10 (basal)); *Vesiculophyllum*, GSC locs. C-4585, C-4586, C-4589, C-4592 to C-4596, 142 ft above base of Shunda Formation to 258 ft above base of Debolt Formation, Zones IIB, IIIA; *Zaphriphyllum*, GSC locs. C-4584, C-4594 to C-4596, 105 ft above base of Pekisko Formation to 258 ft above base of Debolt Formation, Zones IIB, IIIA.
- NEBC-32. North Sukunka River, 1 mi northeast of Sukunka River, 55°05.5'N., 121°50'W., all measurements below top of Rundle Group (GSC internal report). *Siphonodendron*, GSC locs. C-11537, C-11538, 60 to 95 ft, Zone IIIA; *Stelechophyllum*, GSC loc. C-11536, 870 ft, Zone IIB; *Syringopora*, GSC locs. C-11535, C-11537, 95 to 872 ft, Zones IIB, IIIA; *Vesiculophyllum*, GSC loc. C-11537, 95 ft, Zone IIIA.
- NEBC-33. Sukunka River, 2 mi east of Sukunka River, 55°01'30"N., 121°42'W. (GSC internal report). *Amplexizaphrentis*, GSC loc. C-4619, 55 to 60 ft above base of Pekisko Formation, Zone IIB?; *Aulostylus*, GSC locs. C-4626, C-4627, 352 to 372 ft above base of Shunda Formation, Zone IIB; *Michelinia*, GSC loc. C-4619, 55 to 60 ft above base of Pekisko Formation, Zone IIB?; *Stelechophyllum*, GSC locs. C-4622 to C-4625, 134 to 296 ft above base of Shunda Formation, Zone IIB; *Sychnoelasma*, GSC locs. C-4621, C-4627, C-4628, 102 to 492 ft above base of Shunda Formation, Zone IIB; *Vesiculophyllum*, GSC locs. C-4621, C-4627, C-4628, 102 to 372 ft above base of Shunda Formation, Zone IIB.
- NEBC-34. East Sukunka River, 4 mi east of Sukunka River, 55°01'30"N., 121°38'W.; all measurements above base of Rundle Group (GSC internal report). *Ankhelasma*, GSC loc. C-4629, 1,471 ft, Zone IIIA; *Aulostylus*, GSC loc. C-7379, 365 ft, Zone IIB; *Stelechophyllum*, GSC locs. C-7380, C-7381, 280 to 298 ft, Zone IIB; *Sychnoelasma*, GSC loc. C-7379, 365 ft, Zone IIB; *Syringopora*, GSC locs. C-7379, C-7380, 298 to 365 ft, Zone IIB; *Vesiculophyllum*, GSC locs. C-4631, C-4633, C-7380, C-7381, 280 to 995 ft, Zone IIB; *Zaphriphyllum*, GSC locs. C-4629 to 4631, 995 to 1,471 ft, Zones IIB, IIIA.
- NEBC-35. Hook Creek North, ridge east of Hook Creek, 54°49'N., 121°21'W. (GSC internal report). *Siphonodendron*, GSC loc. C-11637, 1 ft below top of Debolt Formation, Zone IIIA.
- NEBC-36. Hook Creek, 5 mi southeast of Hook Lake and 1 mi east of Hook Creek, 54°48'N., 121°19'W. (GSC internal report). *Amplexizaphrentis*, *Ankhelasma*, *Ekuasophyllum*, GSC loc. C-7316, 94 ft above base of Debolt Formation, Zone IIIA; *Siphonodendron*, GSC locs. C-7313, C-7314, C-7317, C-7321, C-7322, C-11544, 9 to 214 ft above base of Debolt Formation, Zone IIIA; *Lophophyllum*?, GSC loc. C-11546, 84 to 94 ft above base of Debolt Formation, Zone IIIA; *Michelinia*, GSC loc. C-7309, 124 to 129 ft above base of Shunda Formation, Zone IIB; *Sychnoelasma*, GSC locs. C-7308, C-7309, C-7310, 82 to 212 ft above base of Shunda Formation, Zone IIB; "*Thysanophyllum*," GSC locs. C-7318, C-7319, C-7320, 126 to 131 ft above base of Debolt Formation, Zone IIIA; *Vesiculophyllum*, GSC locs. C-7304, C-7307, C-7308, C-7310, C-7313, C-7317, C-7322, 138 ft below top of Banff Formation to 214 ft above base of Debolt Formation, Zones II, IIIA; *Zaphriphyllum*, GSC locs. C-7312, C-7316, 341 ft above base of Shunda Formation to 94 ft above base of Debolt Formation, Zones IIB, IIIA.
- NEBC-37. East Fellers Creek, 3 mi northwest of Bone Mountain, 54°42.5'N., 120°54'W. (GSC internal report). *Ankhelasma*, GSC locs. C-7347, C-7350, C-7351, 2 to 38.5 ft above base of Debolt Formation, Zone IIIA;

- Siphonodendron*, GSC locs. C-7349 to C-7357, 37 to 496 ft above base of Debolt Formation, Zone IIIA; *Lophophyllum?*, GSC loc. C-7342, 161 ft above base of Shunda Formation, Zone IIB; *Sychnoelasma*, GSC locs. C-7341 to C-7344, 156 to 1,053 ft above base of Shunda Formation, Zone IIB; *Syringopora*, GSC locs. C-7345, C-7347, C-7352, 284 ft above base of Shunda Formation to 173 ft above base of Debolt Formation, Zones IIB, IIIA; *Vesiculophyllum*, GSC locs. C-7340 to C-7343, C-7345 to C-7348, C-7350, C-7352, 122 ft above base of Shunda Formation to 173 ft above base of Debolt Formation, Zones IIB, IIIA; *Zaphriphyllum*, GSC locs. C-7343, C-7345 to C-7348, C-7355, 171 ft above base of Shunda Formation to 471 ft above base of Debolt Formation, Zones II, IIIA.
- NEBC-38. Murray River, 3 mi east of Murray River, 54°39'N., 120°59'W. (GSC internal report). *Siphonodendron*, GSC loc. C-11798, 515 ft below top of Rundle Group, Zone IIIA?.
- NEBC-39. Mount Becker, 1 mi southwest of Mount Becker, 54°31'N., 120°39'W. (GSC internal report). *Ankhelesma*, GSC loc. C-7377, 257 to 259 ft above base of Debolt Formation, Zone IIIA; *Dorlodotia?*, GSC locs. C-7372 to C-7374, 124 to 140 ft above base of Debolt Formation, Zone IIIA; *Siphonodendron*, GSC locs. C-7364 to C-7370, 393 ft above base of unnamed carbonate-bank facies of Rundle Group to 90 ft above base of Debolt Formation, Zone IIIA; *Lophophyllum?*, GSC locs. C-7358, C-7363, C-7363A, C-7365, 9 ft below top of Banff Formation to 556 ft above base of unnamed carbonate-bank facies of Rundle Group, Zones II, IIIA; *Sychnoelasma*, GSC locs. C-7363, C-7363A, 161 to 182 ft above base of unnamed carbonate-bank facies of Rundle Group, Zone IIB; *Syringopora*, GSC locs. C-7368, C-7372, C-7374, 614 ft above base of unnamed carbonate-bank facies of Rundle Group to 140 ft above base of Debolt Formation, Zone IIIA; *Vesiculophyllum*, GSC locs. C-7363, C-7366, C-7367, C-7374, 161 ft above base of unnamed carbonate-bank facies of Rundle Group to 169 ft above base of Debolt Formation, Zones IIB, IIIA.
- NEBC-40. Belcourt Creek, 4 mi east-northeast of Muinok Mountain, 54°22'N., 120°29.5'W. (GSC internal report). *Ankhelesma*, GSC locs. C-7398, C-7399, 102 to 181 ft above base of Turner Valley Formation, Zone IIIA; *Cyathaxonia*, GSC loc. C-7404, 446 to 450 ft above base of unnamed carbonate-bank facies of Rundle Group, Zone IIIA; *Siphonodendron*, GSC locs. C-7395, C-7396, C-7404, 446 ft above base of unnamed carbonate-bank facies of Rundle group to 264 ft above base of Turner Valley Formation, Zone IIIA; *Lophophyllum?*, GSC locs. C-7401, C-7412 to C-7414, 50 ft below top of Banff Formation to 39 ft above base of unnamed carbonate-bank facies of Rundle Group, Zones IIB, IIIA; *Michelinia*, GSC loc. C-7413, 47 ft below top of Banff Formation, Zone IIB; *Sychnoelasma*, GSC locs. C-7406, C-7410 to C-7412, 158 ft above base of Shunda Formation to 436 ft above base of unnamed carbonate-bank facies of Rundle Group, Zone IIB; *Syringopora*, GSC locs. C-7410, C-7413, 47 ft below top of Banff Formation to 49 ft above base of unnamed carbonate-bank facies of Rundle Group, Zone IIB; *Vesiculophyllum*, GSC locs. C-7394, C-7397 to C-7399, C-7402, C-7407, C-7409, C-7412, 158 ft above base of Shunda Formation to 361 ft above base of Turner Valley Formation, Zones IIB, IIIA, ?IIIB; *Zaphriphyllum*, GSC locs. C-7396, C-7398, C-7409, 99 ft above base of unnamed carbonate-bank facies of Rundle Group to 197 ft above base of Turner Valley Formation, Zones IIB, IIA.
- NEBC-41. West Belcourt Creek, 4 mi west of Muinok Mountain, 54°20'30"N., 120°30'W. (GSC internal report). *Siphonodendron*, GSC loc. C-80126, 10 ft below top of Shunda Formation, Zone IIB?.
- NEBC-42. North Hanington, 5.5 mi northwest of Mount Hanington, 54°10'30"N., 120°15'W. (GSC internal report), all measurements above base of Turner Valley Formation. *Amplexizaphrentis*, GSC loc. C-79628, 384 ft, Zone IIIA; *Ankhelesma*, GSC locs. C-79613, C-79627, C-79632, 20 to 485 ft, Zone IIIA; "*Diphyphyllum*," GSC loc. C-79632, 485 ft, Zone IIIA; *Siphonodendron*, GSC loc. C-79628, 384 ft, Zone IIIA; *Vesiculophyllum* and *Zaphriphyllum*, GSC loc. C-79613, 20 ft, Zone IIIA.
- NEBC-43. Ridge west of Mt. Hanington, 1.5 mi north of Jarvis Lakes, 54°07'N., 120°12'30"W. (GSC internal report). *Amplexizaphrentis*, GSC loc. C-7423, 353 ft above base of Turner Valley Formation, Zone IIIA; *Ankhelesma*, GSC locs. C-7421, C-7423, 353 to 473 ft above base of Turner Valley Formation, Zone IIIA; *Aulostylus*, GSC loc. C-79554, 64 ft above base of Shunda Formation, Zone IIB; *Cyathaxonia*, GSC loc. C-7421, 464 to 473 ft above base of Turner Valley Formation, Zone IIIA; *Dorlodotia*, GSC loc. C-7424, 336 to 338 ft above base of Turner Valley Formation, Zone IIIA; *Sychnoelasma*, GSC locs. C-79548, C-79559, 8 to 210 ft above base of Shunda Formation, Zone IIB; *Syringopora*, GSC locs. C-7418, C-7420, C-79548, 210 ft above base of Shunda Formation to 697 ft above base of Turner Valley Formation, Zones IIB, IIIA, IIIB?; *Vesiculophyllum*, GSC locs. C-7418, C-7422 to C-7424, C-79548, 210 ft above base of Shunda Formation to 697 ft above base of Turner Valley Formation, Zones IIB, IIIA, IIIB?; *Zaphriphyllum*, GSC loc. C-7419, 519 ft above base of Turner Valley Formation, Zone IIIA.

ALBERTA

- AL-1. Brewster's wall, 2 mi southwest of South Sulphur River, 53°28'N., 118°54'W. (see Mountjoy, 1962, p. 32, 108). *Siphonodendron*, GSC loc. 40252, top of Shunda Formation, Zone IIIA; *Lophophyllum?*, *Syringopora*, GSC loc. 40255, 80 ft below top of Shunda Formation, Zone IIB.
- AL-2. Folding Mountain, 0.75 mi south of Highway 16, 53°14'30"N., 117°45'30"W. (GSC internal report; E. W. Bamber, unpublished data). *Amplexizaphrentis*, GSC loc. 55414, basal 10 ft of Turner Valley Formation, Zone IIIA; *Dorlodotia?*, GSC locs. 36772, 55416, 55417, 38 to 43 ft above base of Turner Valley Formation, Zone IIIA; *Siphonodendron*, GSC locs. 36772, 36813, 55413 to 55415, 55418, 290 ft above base of Shunda Formation to 30 ft above base of Turner Valley Formation, Zones IIB, IIIA; *Lophophyllum?*, GSC locs. 36772, 55412, 55414, 52 ft above base of Pekisko Formation and basal 10 ft of Turner Valley Formation, Zone IIIA; *Sychnoelasma*, GSC loc. 55409, 4 to 6 ft above base of Pekisko Formation, Zone IIB; *Syringopora*, GSC locs. 55413, 55414, 55416, 55418, 290 ft above base of Shunda Formation to 10 ft above base of Turner Valley

- Formation, Zones IIB, IIIA; *Vesiculophyllum*, GSC locs. 55409, 55413 to 55415, 55418, 4 ft above base of Pekisko Formation to 30 ft above base of Turner Valley Formation, Zones IIB, IIIA; *Zaphriphyllum*, GSC loc. 55414, basal 10 ft of Turner Valley Formation, Zone IIIA.
- AL-3. Roche De Smet, southeast end of De Smet Range, 53°05'30"N., 118°04'30"W. (see Mountjoy, 1962, section 5, p. 32, 100; E. W. Bamber, unpublished data). *Cleistopora*, GSC loc. C-57119, 165 ft below top of Banff Formation, Zone IIA; *Siphonodendron*, GSC locs. 55419 to 55423, 55431, 31 ft below top of Pekisko Formation to 137 ft below top of Turner Valley Formation, Zones IIB, IIIA; *Lophophyllum?*, GSC locs. C-57117, C-57119, 36756, 155 ft below top of Banff Formation to 90 ft below top of Shunda Formation; *Stelechophyllum*, GSC locs. 55424 to 55428, 55430, 4 ft above base of Pekisko Formation to 168 ft above base of Pekisko Formation, Zone IIB; *Sychnoelasma*, GSC locs. 55427 to 55429, 55431, 55435, 55436, 16 ft above base of Pekisko Formation to 85 ft above base of Shunda Formation, Zone IIB; *Syringopora*, GSC locs. C-57117, C-57119, 55426 to 55429, 55431, 55432, 55434, 155 ft below top of Banff Formation to 58 ft above base of Shunda Formation; *Vesiculophyllum*, GSC locs. 36756, 36800, 55426 to 55428, 55431 to 55436, 16 ft above base of Pekisko Formation to 90 ft below top of Shunda Formation, Zone IIB; *Zaphriphyllum*, GSC loc. 55434, 53 to 58 ft above base of Shunda Formation, Zone IIB.
- AL-4. Jasper lake, on south side of Highway 16, between Talbot Lake and Jasper Lake, 53°05'N., 118°01'30"W. (see Mountjoy, 1965, p. 342; E. W. Bamber, unpublished data). *Siphonodendron*, GSC locs. 55439 to 55442, uppermost Shunda Formation or lowermost Turner Valley Formation, Zone IIIA.
- AL-5. Cadomin, along railroad cuts west of town, 52°59'N., 117°20'W. (see Macqueen, 1966; GSC internal report). *Syringopora*, GSC locs. 74857, 74864, 125 ft below top of Banff Formation to 28 ft above base of Turner Valley Formation, Zones IIB, IIIA; *Vesiculophyllum*, GSC loc. 74863, 31 ft above base of Shunda Formation, Zone IIB; *Siphonodendron*, GSC loc. 74864, 28 ft above base of Turner Valley Formation, Zone IIIA.
- AL-6. Mount Merlin, 52°57'N., 117°43'W. (GSC internal report). *Siphonodendron*, GSC locs. 74964 to 74966, 118 to 162 ft above base of Turner Valley Formation, Zone IIIA; *Stelechophyllum*, GSC loc. 74961, 49 ft above base of Pekisko Formation, Zone IIB; *Syringopora*, GSC locs. 74962 to 74964, top of Shunda Formation to 121 ft above base of Turner Valley Formation, Zone IIIA; *Vesiculophyllum*, GSC locs. 74960, 74961, 74964, 74965, 5 ft above base of Pekisko Formation to 140 ft above base of Turner Valley Formation, Zones IIB, IIIA.
- AL-7. Sirdar Mountain, 52°54'N., 117°48'W. (GSC internal report). *Syringopora*, GSC loc. 74912, 435 ft above base of Turner Valley Formation, Zone IIIA; *Vesiculophyllum*, GSC loc. 74913, 7 ft above base of Mount Head Formation, Zone IIIA; *Zaphriphyllum*, GSC loc. 74914, 39 ft above base of Mount Head Formation, Zone IIIA.
- AL-8. Deception Creek, 52°51'N., 117°21'W. (GSC internal report). *Siphonodendron*, GSC locs. 74942, 74945, 74946, 42 to 119 ft above base of Turner Valley Formation, Zone IIIA; *Michelinia*, *Stelechophyllum*, GSC locs. 74937, 74939, lower 29 ft of Pekisko Formation, Zone IIB; *Syringopora*, GSC locs. 74939, 74943, 74944, 29 ft above base of Pekisko Formation to 76 ft above base of Turner Valley Formation, Zones IIB, IIIA; *Vesiculophyllum*, GSC locs. 74933, 74937 to 74941, 74948, 418 ft above base of Banff Formation, to 91 ft above base of Mount Head Formation, Zones IIA or IIB, IIIA; *Zaphriphyllum*, GSC loc. 74938, 16 ft above base of Pekisko Formation, Zone IIB.
- AL-9. Rocky River, 52°47'N., 117°26'W. (GSC internal report). *Siphonodendron*, GSC locs. 74976 to 74979, 74981, 74983, 61 ft above base of Turner Valley Formation to 54 ft above base of Mount Head Formation, Zone IIIA; *Michelinia*, GSC locs. 74974, 74975, 135 to 146 ft above base of Pekisko Formation, Zone IIB; *Stelechophyllum*, GSC locs. 74971, 74973, 3 to 9 ft above base of Pekisko Formation, Zone IIB; *Syringopora*, GSC locs. 74971, 74982, 9 ft above base of Pekisko Formation to 62 ft above base of Mount Head Formation, Zones IIB, IIIA; *Vesiculophyllum*, GSC locs. 74971, 74980, 9 ft above base of Pekisko Formation to 32 ft above base of Mount Head Formation, Zones IIB, IIIA; *Zaphriphyllum?*, GSC loc. 74982, 62 ft above base of Mount Head Formation, Zone IIIA.
- AL-10. Southesk-Cairn, 52°43'N., 117°12'W. (GSC internal report). *Siphonodendron*, GSC locs. 74951 to 74954, 69 to 232 ft above base of Turner Valley Formation, Zone IIIA; *Syringopora*, GSC locs. 74950, 74953, 96 ft above base of Turner Valley Formation to 35 ft above base of Mount Head Formation, Zone IIIA; *Vesiculophyllum*, GSC loc. 74953, 96 ft above base of Turner Valley Formation, Zone IIIA.
- AL-11. Nordegg, along David Thompson Highway, composite section, 52°29'N., 116°04'W. (GSC internal report). *Stelechophyllum*, GSC locs. 74867, 74869, 74870, 74871 to 74874, lower part and uppermost part of Pekisko Formation, contacts not exposed, Zone IIB; *Vesiculophyllum*, GSC locs. 74867, 74873, lower part of Pekisko Formation, contact not exposed, Zone IIB.
- AL-12. Job Creek, 52°23'N., 116°43'W. (GSC internal report). *Michelinia*, GSC loc. 74919, 154 ft below top of Banff Formation, Zone IIA or IIB; *Siphonodendron*, GSC locs. 74925, 74926, 160 to 181 ft above base of Turner Valley Formation, Zone IIIA; *Lophophyllum?*, GSC loc. 74920, 126 ft below top of Banff Formation, Zone IIB; *Stelechophyllum*, GSC loc. 74922, base of Pekisko Formation?, Zone IIB; *Syringopora*, GSC loc. 74916, 308 ft below top of Banff Formation, Zone IIA or IIB; *Vesiculophyllum*, GSC locs. 74916, 74924, 74928, 308 ft below top of Banff Formation, to 16 ft above base of Mount Head Formation, Zones IIA or IIB, IIIA.
- AL-13. Sentinel Mountain, 52°05'N., 116°26'W. (GSC internal report). *Siphonodendron*, GSC loc. 68537, 219 to 224 ft above base of Turner Valley Formation, Zone IIIA; *Syringopora*, GSC loc. 68521, 359 to 365 ft above base of Banff Formation, Zone IIA?
- AL-14. Forbidden Creek, 51°48'N., 115°50'W. (see Macqueen and Bamber, 1967, 1968). *Faberophyllum*, GSC loc. 68592, 335 ft above base of Mount Head Formation, Zone IV; *Siphonodendron*, GSC locs. 68589, 68591, 133 to 404 ft above base of Turner Valley Formation, Zone IIIA; *Stelechophyllum*, GSC loc. 68575, 7 ft above base of Pekisko Formation, Zone IIB.

- AL-15. Clearwater River, 51°47'N., 116°04'W. (see Macqueen and Bamber, 1967, 1968). *Ekuvasophyllum*, GSC locs. 68506, 68510, 68512, 358 to 518 ft above base of Mount Head Formation, Zone IIID; *Siphonodendron*, GSC locs. 68504, 68511, 68513, 595 ft above base of Turner Valley Formation, to 518 ft above base of Mount Head Formation, Zones IIIA, IIID; ?*Petalaxis*, GSC loc. 68511, 482 ft above base of Mount Head Formation, Zone IIID; *Syringopora*, GSC loc. 68512, 518 ft above base of Mount Head Formation, Zone IIID.
- AL-16. Divide Creek, approximately 4 mi north of Mt. Tyrrell, 51°45'N., 115°53'W. (see Macqueen and Bamber, 1967, 1968). *Amplexizaphrentis*, GSC loc. 68562, 136 ft above base of Mount Head Formation, Zone IIID; *Dorlodotia*?, *Ekuvasophyllum*, GSC loc. 68563, 161 to 169 ft above base of Mount Head Formation, Zone IIID; *Stelechophyllum*, GSC locs. 68551, 68563, 38 ft below top of Banff Formation to 169 ft above base of Mount Head Formation, Zones IIB, IIID; *Syringopora*, GSC locs. 68545, 68547, 68550 to 68552, 327 to 12 ft below top of Banff Formation; *Vesiculophyllum*, GSC loc. 68553, 161 ft above base of Pekisko Formation, Zone IIB.
- AL-17. Mount Tyrrell-Mount White, 51°40'N., 115°50'W. (see Macqueen and Bamber, 1967, 1968). *Amplexizaphrentis*, GSC loc. 66136, 30 ft above base of Etherington Formation, Zone V?; *Ekuvasophyllum*, GSC loc. 66135, top beds of Carnarvon Member, Mount Head Formation, Zone IV; *Siphonodendron*, *Syringopora*, GSC loc. 66132, uppermost Shunda Formation, Zone IIIA.
- AL-18. McConnell Creek, north side of Red Deer River, 51°39'N., 115°58'W. (GSC internal report). *Dorlodotia*, GSC loc. C-22, 5 ft above base of Shunda Formation, Zone IIB; *Siphonodendron*, GSC loc. C-21, 20 ft below top of Shunda Formation, basal Zone IIIA; *Lophophyllum*?, GSC locs. C-17, C-21, 915 ft above base of Exshaw Formation, (5 ft above base of "middle member" of Banff Formation) to 20 ft below top of Shunda Formation, Zone IIB; *Sychnoelasma*, GSC loc. C-17, 5 ft above base of "middle member" of Banff Formation, Zone IIB.
- AL-19. Fagan's Lake, 51°36'N., 115°46'W. (see Macqueen and Bamber, 1967, 1968). *Siphonodendron*, GSC loc. 68469, 308 to 311 ft above base of Turner Valley Formation, Zone IIIA; *Lophophyllum*?, GSC loc. 68456, 760 to 765 ft above base of Banff Formation, Zone IIB?; *Syringopora*, GSC locs. 68450, 68454, 68457, 545 to 873 ft above base of Banff Formation, Zones IIA?, IIB; *Vesiculophyllum*, GSC loc. 68464, 172 ft above base of Pekisko Formation, Zone IIB.
- AL-20. Sheep Creek, 51°35'N., 115°29'W. (see Macqueen and Bamber, 1967, 1968). *Lophophyllum*?, *Syringopora*, GSC loc. 66104, 41 ft below top of Banff Formation, Zone IIB; *Stelechophyllum*, GSC locs. 66105, 66106, 6 ft below top of Banff Formation to 12 ft above base of Shunda Formation, Zone IIB.
- AL-21. Panther River, 51°34'N., 115°43'W. (see Macqueen and Bamber, 1967, 1968). *Amplexizaphrentis*, GSC loc. 62081, 74 ft below top of Loomis Member?, Mount Head Formation; Zone IIIC or IIID; *Siphonodendron*, GSC loc. 62083, Opal Member, Mount Head Formation, talus, Zone IIID; *Lophophyllum*?, GSC loc. 66137, 153.5 ft below top of Banff Formation, Zone IIB; *Syringopora*, GSC locs. 62080, 62082, 40 to 80 ft below top of Loomis Member?, Mount Head Formation, Zone IIIC or IIID; *Vesiculophyllum*, GSC locs. 66141, 66144, 66147, 164 ft below top of Banff Formation, to 507? ft above base of Livingstone Formation, Zone IIB?.
- AL-22. Cascade River, 51°25'N., 115°45'W. (see Macqueen and Bamber, 1967). *Amplexizaphrentis*, GSC locs. 73526, 73527, 224 to 269 ft below top of Banff Formation, Zone IIA or IIB; *Michelinia*, GSC loc. 73525, 286 to 289 ft below top of Banff Formation, Zone IIA or IIB; *Stelechophyllum*, GSC loc. 73532, 821 ft above base of Livingstone Formation, Zone IIB?; *Sychnoelasma*, GSC loc. 73531, 811 ft above base of Livingstone Formation Zone IIB; *Syringopora*, GSC loc. 73519, 761 ft below top of Banff Formation, (in lower half of formation), Zone I?
- AL-23. Ghost River, near headwaters on northeast fork, 51°23'30"N., 115°24'W. (see Macqueen and Bamber, 1967, 1968). *Siphonodendron*, GSC locs. 68408, 68409, 381 to 419 ft above base of Turner Valley Formation, Zone IIIA; *Stelechophyllum*, GSC locs. 68403, 68405, 780 ft above base of Banff Formation to 189 ft above base of Pekisko Formation, Zone IIB; *Sychnoelasma*, GSC loc. 68404, 645 to 650 ft above base of Banff Formation, Zone IIB; *Syringopora*, GSC loc. 68394, 530 to 545 ft above base of Banff Formation, Zone IIA or IIB; *Vesiculophyllum*, GSC locs. 68401, 68410, 739 ft above base of Banff Formation, to 62 ft above base of Mount Head Formation, Zones IIB, IIIA.
- AL-24. Mount Aylmer, 2.5 mi northwest of mountain, 51°20.5'N., 115°28'W. (see Macqueen and Bamber, 1967, 1968). *Acroclyathus*, GSC locs. 68389, 68391, 104 ft above base of Loomis Member to top of member, Mount Head Formation, Zone IIID; *Clisiophyllum*, GSC loc. 68392, 72 ft above base of Carnarvon Member, Mount Head Formation, Zone IV; *Ekuvasophyllum*, GSC loc. 68389, 47 ft above base of Loomis Member, Mount Head Formation, Zone IIIC or IIID; *Faberophyllum*, GSC loc. 68392, 72 ft above base of Carnarvon Member, Mount Head Formation, Zone IV; *Siphonodendron*, GSC loc. 68387, 35 ft above base of Livingstone Formation, Zone IIB?; *Syringopora*, *Vesiculophyllum*, GSC locs. 68384, 68385, 880 to 1,010 ft above base of Banff Formation, Zone IIB?.
- AL-25. Stoney Creek, 51°22'N., 115°34'W., Mount Head Formation (see Macqueen and Bamber, 1968). *Acroclyathus*, GSC locs. 66156, 66157, 66160, 66 ft below top of Loomis Member to 25 ft above base of Opal Member, Zone IIID; *Ekuvasophyllum*, GSC locs. 66155, 66157, 66160, 86 ft below top of Loomis Member to 25 ft above base of Opal Member, Zone IIID; *Faberophyllum*, GSC loc. 66163, 25 to 26 ft above base of Carnarvon Member, Zone IV; *Siphonodendron*, GSC locs. 66153, 66156, 66157, 42 ft below top of Salter Member to 37 ft below top of Loomis Member, Zone IIIB?, IIID; *Syringopora*, GSC locs. 66156, 66157, 37 to 66 ft below top of Loomis Member.
- AL-26. Camp Creek, 51°20'N., 115°29'W. (see Macqueen and Bamber, 1967, 1968). *Siphonodendron*, GSC loc. 68374, 248 ft above base of Livingstone Formation, Zone IIB?; *Lophophyllum*?, GSC loc. 68369, 652 ft below top of Banff Formation, Zone IIB?; *Syringopora* and *Vesiculophyllum*, GSC loc. 68367, 742 ft below top of Banff Formation, Zone IIA or IIB.
- AL-27. Mount Costigan, north side of Lake Minnewanka, 51°16'N., 115°17'W. (see Macqueen and Bamber, 1967). ?*Sychnoelasma*, *Vesiculophyllum*, GSC loc. 74901, 964 ft

- above base of Banff Formation, Zone IIB; *Syringopora*, GSC locs. 74900, 74902, 920 to 1,032 ft above base of Banff Formation, Zone IIB.
- AL-28. Lake Minnewanka, north shore of lake, 51°15'N., 115°28'W. (see Shimer, 1926; Crickmay, 1955; Macqueen and Bamber, 1967, 1968). *Acroclyathus*, GSC locs. 62020, 62026, 62028 to 62030, Mount Head Formation, 141 ft above base of Salter Member to 9 ft below top of Loomis Member, Zones IIIB, IIIC, IIID; ?*Amplexizaphrentis*, GSC locs. 62014, 62016, bed 14 of Crickmay (1955), 55 to 63 ft below top of Livingstone Formation, Zone IIIA?; ?*Canadiphyllum*, GSC loc. 62012, 88 to 89 ft below top of Livingstone Formation, Zone IIIA?; *Dorlodotia*?, GSC loc. 62017, 22 ft below top of Livingstone Formation, Zone IIIA?; *Ekvasophyllum*, GSC locs. 62019, 62026, 62032, 62035, 62036, Mount Head Formation, 45 ft above base of Salter Member to 19 ft above base of Carnarvon Member, Zones IIIB, IIIC, IIID, IV; *Faberophyllum*, Mount Head Formation, Carnarvon Member, bed 3 of Crickmay (1955), Zone IV; *Siphonodendron*, GSC locs. 62002, 62004, 62009, 62026 to 62029, lowermost 10 ft of Livingstone Formation to 27 ft below top of Loomis Member, Mount Head Formation, Zones IIB, IIID; *Lophophyllum*?, GSC locs. 60995, 62007, 282 ft below top of Banff Formation to 451 ft above base of Livingstone Formation, Zone IIB; *Petalaxis*, GSC loc. 62031, 5 to 9 ft below top of Loomis Member, Mount Head Formation, Zone IIID; *Sciophyllum*, section 2, bed 8 of Shimer (1926), upper Opal Member, Mount Head Formation, Zone IV; *Sychnoelasma*, GSC loc. 62003, 109 to 110 ft above base of Livingstone Formation, Zone IIB; *Syringopora*, GSC locs. 62000, 62002, 62007, 62009, 62015, 62017, 62026, 62028, 62031, 120 ft below top of Banff Formation to 5 ft below top of Loomis Member, Mount Head Formation, Zones IIB, IIIA, IIID; "*Thysanophyllum*," GSC loc. 62032, 38 ft above base of Opal Member, Mount Head Formation, Zone IIID; *Vesiculophyllum*, GSC loc. 62000, 118 to 120 ft below top of Banff Formation, Zone IIB; *Zaphriphyllum*, GSC locs. 60996, 62015, 239 ft below top of Banff Formation to 60 ft below top of Livingstone Formation, Zones IIB?, IIIA.
- AL-29. Tunnel Mountain, north side of Bow River, 51°10'N., 115°33'W. (see Macqueen and Bamber, 1967, 1968). *Acroclyathus*, GSC loc. 58183, 62 ft above base of Opal Member, Mount Head Formation, Zone IIID; *Ekvasophyllum*?, GSC loc. 58182, 57 ft above base of Opal Member, Mount Head Formation, Zone IIID; *Faberophyllum*, GSC loc. 58185, 328 ft above base of Opal Member, Mount Head Formation, Zone IV; *Siphonodendron*, GSC loc. 58177, 49 ft below top of Livingstone Formation, Zone IIIA?. "*Thysanophyllum*," GSC type no. 8911, ca. 1,640 ft above base of Rundle Group, Zone IV.
- AL-30. Carrot Creek, 51°10'N., 115°23'W. (see Macqueen and Bamber, 1967, 1968). *Faberophyllum*, GSC locs. 66171, 66172, 118 to 148 ft above base of Opal Member, Mount Head Formation, Zone IV; *Vesiculophyllum*, GSC loc. 60994, upper Banff Formation, Zone IIB?.
- AL-31. Upper Exshaw Creek, head of creek, 51°09'N., 115°13'W., Mount Head Formation (see Macqueen and Bamber, 1968). *Acroclyathus*, GSC locs. 58160 to 58164, 36 ft below top of Salter Member to 72 ft above base of Loomis Member, Zone IIIB, IIIC, IIID; *Ekvasophyllum*, GSC locs. 58165, 58171, 82 ft above base of Loomis Member to 53 ft above base of Marston Member, Zone IIID; *Syringopora*, GSC loc. 58163, 44.5 ft above base of Loomis Member, Zone IIID.
- AL-32. Upper Jura Creek, 51°08'N., 115°11'W. (see Macqueen and Bamber, 1967). *Siphonodendron*, *Vesiculophyllum*, GSC loc. 74892, top 10 ft of Banff Formation, Zone IIB; *Michelinia*, GSC loc. 74889, 543 ft below top of Banff Formation, Zone IIA?; *Syringopora*, GSC loc. 74888, 599 ft below top of Banff Formation, Zone IIA?.
- AL-33. Grotto Creek, 51°06'N., 115°19'W. (see Macqueen and Bamber, 1967, 1968). *Acroclyathus*, GSC loc. 62064, lower Carnarvon Member, Mount Head Formation, Zone IV; *Ekvasophyllum*, GSC locs. 62045, 62046, 62056, 62057, 62060, 62061, 62063, 47 ft below top of Livingstone Formation to 74 ft above base of Opal Member, Mount Head Formation, Zone IIIA? to IV; *Faberophyllum*, GSC loc. 62063, 49 to 74 ft above base of Opal Member, Mount Head Formation, Zone IV; *Syringopora*, GSC loc. 62062, 23 ft below top of Loomis Member, Mount Head Formation, Zone IIID; ?*Zaphriphyllum*, GSC loc. 62046, 13 ft above base of Salter Member, Mount Head Formation, Zone IIIA or IIIB.
- AL-34. Pigeon Mountain, along south side of Trans-Canada Highway, 51°02'N., 115°13'W. (see Macqueen and Bamber, 1967). *Sychnoelasma*, GSC loc. 69573, 107 ft below top of Banff Formation, Zone IIA; *Syringopora*, GSC 69572, 199 ft below top of Banff Formation, Zone IIB?.
- AL-35. Lower Jura Creek, 51°05'N., 115°10'W. (see Macqueen and Bamber, 1967). *Stelechophyllum*, GSC loc. 62109, 50 ft below top of Banff Formation, Zone IIB; *Syringopora*, GSC locs. 62103, 62106 to 62109, 50 to 555 ft below top of Banff Formation, Zones I?, IIB; *Vesiculophyllum*, GSC locs. 62109, 62110, 29 to 50 ft below top of Banff Formation, Zone IIB.
- AL-36. Brewster Creek, 51°00'N., 115°36'W., all measurements above base of Opal Member, Mount Head Formation (see Macqueen and Bamber, 1968). *Ekvasophyllum*, GSC locs. 68429, 68431, 68432, 68435, 68436 to 68438, 68441, 25 to 430 ft, Zones IIID, IV; *Faberophyllum*, GSC locs. 68440 to 68442, 320 to 452 ft, Zone IV; *Siphonodendron*, GSC loc. 68430, 40 ft, Zone IIID; *Sciophyllum*, GSC loc. 68439, 275 ft, Zone IV.
- AL-37. Mount Lorette, south side of mountain, 50°58'30"N., 115°07'W. (see Macqueen and Bamber, 1967). *Acroclyathus*, GSC loc. 58150, middle Loomis Member, Mount Head Formation, Zone IIIC or IIID; *Syringopora*, GSC loc. 58030, lower Livingstone Formation, Zone IIB?.
- AL-38. Mount McDougall, 1.25 mi north-northwest of peak, east of mouth of Evans-Thomas Creek, 50°55'N., 115°05'W., Mount Head Formation (see Macqueen and Bamber, 1968). *Acroclyathus*?, GSC loc. 58140, 233 to 234 ft above base of Opal Member, Zone IV; ?*Clisiophyllum*, GSC loc. 58145, uppermost Carnarvon Member, Zone IV; *Ekvasophyllum* and *Syringopora*, GSC locs. 58122, 58126, 0.5 to 60 ft below top of Loomis Member, Zone IIID; *Siphonodendron* and *Stelechophyllum*, GSC loc. 58126, 0.5 ft below top of Loomis Member, Zone IIID.
- AL-39. Canyon Creek, east and west flanks of "Moose Dome," 50°54'N., 114°53'W. (see Macqueen and Bamber, 1967; Bamber, Macqueen, and Ollerenshaw, 1981). *Siphonodendron*, GSC loc. 66346, 117 ft below top of

- Turner Valley Formation, Zone IIIA; *Lophophyllum*?, uppermost Banff Formation, Zone IIB; *Stelechophyllum*, 10 ft below top of Banff Formation to 3 ft above base of Pekisko Formation, Zone IIA; *Sychnoelasma*, GSC loc. 66336, lower Shunda Formation, Zone IIB; *Syringopora*, GSC locs. 66326, 66328, 66329, 66336, 66342, upper Banff Formation to lower Turner Valley Formation, Zones IIB, IIIA; *Vesiculophyllum*, upper Banff Formation to lower Turner Valley Formation, Zones IIB, IIIA; *Zaphriphyllum*, lower Turner Valley Formation, Zone IIIA.
- AL-40. Grizzly Creek, 50°46'N., 115°07'30"W. (see Macqueen and Bamber, 1968). *Canadiphyllum*, GSC loc. 58039, 42 ft above base of Salter Member, Mount Head Formation, Zone IIIB?; *Siphonophyllia*, GSC loc. 58083, 34 ft above base of Etherington Formation, Zone V; *Faberophyllum*, GSC loc. 58078, 326 ft above base of Opal Member, Mount Head Formation, Zone IV; *Petalaxis*, GSC loc. 58044, 205 ft above base of Loomis Member, Mount Head Formation, Zone IIID; *Syringopora*, GSC locs. 58039, 58080, 42 ft above base of Salter Member to 21 ft above base of Carnarvon Member, Mount Head Formation, Zones IIIB?, IV.
- AL-41. Middle Mountain, 2.5 mi west of Little Elbow River, 50°44'N., 115°03'W., Mount Head Formation unless otherwise indicated (see Macqueen and Bamber, 1967, 1968). *Acrocyathus*, GSC locs. 66283, 66289, 66303, 31 ft below top of Loomis Member to 109 ft above base of Opal Member, Zones IIID, IV?; *Ekvasophyllum*, GSC locs. 66282 to 66284, 66299, 66302, 66303, 38 ft below top of Livingstone Formation to 13 ft below top of Loomis Member, Zones IIIB?, IIID; *Siphonodendron*, GSC locs. 66282, 66283, 16 to 29 ft below top of Loomis Member, Zone IIID; *Syringopora* GSC locs. 66282, 66289, 25 ft below top of Loomis Member to 109 ft above base of Opal Member, Zones IIID, IV?.
- AL-42. Rover Mountain-Beaver Ridge, composite section approximately 1 mi west of Little Elbow River, 50°44'N., 115°01'W., Mount Head Formation (see Macqueen and Bamber, 1967, 1968). *Acrocyathus* and *Siphonodendron*, GSC loc. 66268, 14 ft below top of Loomis Member, Zone IIID; *Ekvasophyllum*, GSC locs. 66260, 66261, 66264, 27 ft above base of Baril Member to 47 ft above base of Loomis Member, Zones IIIA?, IIIC?; *Syringopora*, GSC locs. 66261, 66264, 66268, top bed of Baril Member to 14 ft below top of Loomis Member, Zones IIIA?, IIIC?, IIID.
- AL-43. Mount Hood, 50°44'N., 115°04'W. (see Macqueen and Bamber, 1967, 1968). *Acrocyathus*, GSC locs. 66235, 66245, 66249, 66251, Mount Head Formation, 50 ft below top of Salter Member to 18 ft below top of Opal Member, Zones IIIB, IIID, IV; *Canadiphyllum*, GSC loc. 66252, 83 to 87 ft below top of Livingstone Formation, Zone IIIA?; *Ekvasophyllum*, GSC loc. 66250, 23 to 33 ft below top of Loomis Member, Mount Head Formation, Zone IIID; *Siphonodendron*, GSC loc. 66255, 65 ft above base of Livingstone Formation, Zone IIB; *Syringopora*, GSC locs. 66232, 66249, 66250, Mount Head Formation, 33 ft below top of Loomis Member to 7 ft below top of Opal Member, Zones IIID, IV.
- AL-44. King Creek, measured in canyon approximately 1 mi upstream from Kananaskis Road, 50°43'N., 115°06'W., all measurements above base of Opal Member, Mount Head Formation, unless otherwise indicated (see Macqueen and Bamber, 1968). *Acrocyathus*, GSC locs. 57997, 58000, 76 to 140 ft, Zone IIID; *Ekvasophyllum*, GSC locs. 57998, 58002 to 58005, 84 to 307 ft, Zones IIID, IV; *Faberophyllum*, GSC loc. 58007, 470 ft, Zone IV; *Koninckophyllum*, GSC loc. 58001, 168 ft, Zone IIID; *Siphonodendron*, GSC locs. 57998, 58001, 58005, 84 to 307 ft, Zone IIID; *Schoenophyllum*, GSC loc. 58023, 238 ft above base of Etherington Formation, Zone V; *Stelechophyllum*, GSC loc. 58001, 168 ft, Zone IIID; *Syringopora*, GSC loc. 57999, 96 ft, Zone IIID.
- AL-45. Opal Range, west slope, on east side of Kananaskis-Coleman Highway, 50°43'N., 115°05'W., lower Etherington Formation, Zone V (GSC internal report; see Scott, 1964, Mount Wintour). *Siphonophyllia*, GSC loc. 53423; *Schoenophyllum*, GSC loc. 53422.
- AL-46. Elpoca Creek, approximately 0.75 mi upstream from Kananaskis Forestry Road, 50°39'N., 115°04'W., all measurements above base of Opal Member, Mount Head Formation, unless otherwise indicated (see Macqueen and Bamber, 1968). *Acrocyathus*, GSC locs. 58095, 58098, 58101, 58105, 52 to 313 ft, Zones IIID, IV; *Amplexizaphrentis*, GSC loc. 58118, 9 ft above base of Etherington Formation, Zone V?; *Ekvasophyllum*, GSC locs. 58093, 58095, 58100 to 58102, 58108, 58109, 26 to 384.5 ft, Zones IIID, IV; *Faberophyllum*, GSC locs. 58102, 58103, 58110, 58111, 244 to 515.5 ft, Zone IV; *Siphonodendron*, GSC locs. 58096, 58099, 54 to 104 ft, Zones IIID, IV; *Petalaxis*, GSC loc. 58094, 38 ft, Zone IIID; *Stelechophyllum*, GSC locs. 58099, 58101, 58104, 101.5 to 204 ft, Zone IV; *Syringopora*, GSC locs. 58095, 58099, 58101, 58103, 58104, 58107, 52 to 325 ft, Zones IIID, IV; *Thysanophyllum*, GSC loc. 58109, 383.5 to 384.5 ft, Zone IV.
- AL-47. Elbow Lake, about 0.5 mi east of Kananaskis Road, 50°38'N., 115°00'W., Mount Head Formation, unless otherwise indicated (see Macqueen and Bamber, 1968). *Acrocyathus*, GSC locs. 66186, 66200, 66204, 66208, 95 to 530 ft above base of Opal Member, Zones IIID, IV; *Amplexizaphrentis*, GSC loc. 66184, 13 ft above base of Etherington Formation, Zone V?; *Clisiophyllum*, GSC loc. 66185, 9 to 12 ft above base of Carnarvon Member, Zone IV; *Ekvasophyllum*, GSC locs. 66200, 66204, 66206, to 66208, 95 to 212 ft above base of Opal Member, Zones IIID, IV; *Siphonodendron*, GSC locs. 66204, 66206, 78 to 147 ft above base of Opal Member, Zone IIID; *Stelechophyllum*, GSC loc. 66200, 212 ft above base of Opal Member, Zone IV; *Syringopora*, GSC locs. 66185, 66186, 5 ft below top of Opal Member to 12 ft above base of Carnarvon Member, Zone IV; *Schoenophyllum*, GSC loc. 66179, 110 to 111 ft above base of Etherington Formation, Zone V.
- AL-48. Boulder Creek, 1.5 mi south of Mt. Burns, 50°37'N., 114°52'W., Mt. Head Formation (see Macqueen and Bamber, 1967, 1968). *Acrocyathus*?, GSC loc. 66325, upper Carnarvon Member, Zone IV; *Canadiphyllum*, GSC loc. 66314, upper 4 ft of Baril Member, Zone IIIA?; *Ekvasophyllum*, GSC locs. 66309, 66313, 66317, 19 ft below top of Wileman Member to 18 ft below top of Loomis Member, Zones IIIA?, IIID; *Siphonodendron*, GSC loc. 66317, 18 to 21 ft below top of Loomis Member, Zone IIID; *Syringopora*, GSC locs. 66312, 66317, 66325, 44 ft below top of Baril Member to upper Carnarvon Member, Zones IIIA?, IIIC?, IV; *Zaphriphyllum*, GSC loc. 66312, 44 to 46 ft below top of Baril Member, Zone IIIA?.

- AL-49. Storm Creek, cirque at head of creek, 50°37'N., 114°59'W. (GSC internal reports; see Scott, 1964; Macqueen and Bamber, 1968). *Amplexizaphrentis*, GSC loc. 57934, 15 ft above base of Etherington Formation, Zone V?; *Acroclyathus*, GSC locs. 57938, 57947, 57953, 57968, 57971, 57973, 57976, 57977, 57987, 74876, 74877, 74878, 74879, 10 to 524.5 ft above base of Opal Member, Mount Head Formation, Zones IIID, IV; *Siphonophyllia*, GSC loc. 53475, lower Etherington Formation, Zone V; *Clisiophyllum*, GSC loc. 53462, Carnarvon Member?, Mount Head Formation, Zone IV; *Ektasophyllum*, GSC locs. 57943, 57955, 57972, 57977, 57983, 57985, 57987, 57988, 57992, 57993, 10 ft below top of Loomis Member to 500 ft above base of Opal Member, Mount Head Formation, Zones IIID, IV; *Faberophyllum*, GSC locs. 57939 to 57942, 57945, 57947, 57949, 57951, 57953, 57954, 390 to 519.5 ft above base of Opal Member, Mount Head Formation, Zone IV; *Koninkophyllum*, GSC loc. 53462, Carnarvon Member?, Mount Head Formation, Zone IV; *Petalaxis*, GSC loc. 57985, 19 ft above base of Opal Member, Mount Head Formation, Zone IIID; *Pleurosiphonella*, uppermost Etherington Formation, Zone VI; *Syringopora*, GSC locs. 57933, 57934, 57937, 57938, 57940, 57944, 57965, 57979, 57982, 57988, 57992, 57993, 45 ft below top of Loomis Member to 531 ft above base of Opal Member, Mount Head Formation, Zones IIID, IV; "*Thysanophyllum*," GSC locs. 57969, 57974, 166 to 180 ft above base of Opal Member, Mount Head Formation, Zone IIID or lower IV.
- AL-50. South Misty Range, 2 mi north-northwest of Mist Mountain, 50°34.5'N., 114°56'W., Mount Head Formation, unless otherwise indicated (see Macqueen and Bamber, 1968). *Amplexizaphrentis*, GSC loc. 57872, lower Etherington Formation, Zone V?; *Ektasophyllum*, GSC locs. 57905 to 57907, 57911, 111 ft below top of Loomis Member to 6 ft above base of Opal Member, Zone IIID; *Faberophyllum*, GSC loc. 57874, 94 ft below top of Opal Member, Zone IV; *Siphonodendron*, GSC locs. 57902, 57904, 27 to 102 ft above base of Opal Member, Zone IIID; *Petalaxis*, GSC loc. 57905, 6 ft above base of Opal Member, Zone IIID; *Syringopora*, GSC loc. 57909, 31 ft below top of Loomis Member, Zone IIID.
- AL-51. Picklejar Lakes, north side of valley, at head of Picklejar Creek, 50°32'N., 114°46'W. (see Macqueen and Bamber, 1967, 1968). *Ektasophyllum*, GSC locs. 57839, 57846, 15 ft below top of Baril Member to 16 ft above base of Marston Member, Mount Head Formation, Zones IIIA?, IIID; *Siphonodendron*, GSC loc. 57846, 16 ft above base of Marston Member, Mount Head Formation, Zone IIID; *Zaphriphyllum*, GSC loc. 57856, 19 ft below top of Livingstone Formation, Zone IIIA?.
- AL-52. Lantern Creek headwaters, Highwood Range, 50°31'30"N., 114°47'30"W. (GSC internal report; see Scott, 1964). *Amplexizaphrentis*, GSC locs. 53455, 53456, 53457, 170 to 200 ft below top of Etherington Formation, Zone V?.
- AL-53. Flat Creek, 50°30'N., 114°40'W. (see Douglas, 1958; Macqueen and Bamber, 1967, 1968). *Ektasophyllum*, GSC loc. 57774, upper Livingstone Formation, Zone IIIA?; *Siphonodendron*, GSC loc. 57773, upper Livingstone Formation, Zone IIIA?; *Syringopora*, GSC locs. 57773, 69581, 770 ft above base of Banff Formation to upper part of Livingstone Formation, Zones IIB?, IIIA?; *Vesiculophyllum*, GSC loc. 69589, 990 ft above base of Livingstone Formation, Zone IIIA?; *Zaphriphyllum*, GSC loc. 57773, upper Livingstone Formation, Zone IIIA?.
- AL-54. Highwood River, north side of valley, 50°24'N., 114°37'W. (see Douglas, 1958; Macqueen and Bamber, 1968). *Ektasophyllum*, GSC loc. 57751, 48 ft below top of Marston Member, Mount Head Formation, Zone IIID or lower IV.
- AL-55. Palliser Range, east side of Cascade River, approximately 10 mi above its mouth, 50°24'N., 115°37'W. (GSC internal report; see Scott, 1964). *Amplexizaphrentis*, GSC loc. 53468, basal bed of Etherington Formation, Zone V?.
- AL-56. Mount Burke, 50°17'N., 114°32'W. (see Macqueen and Bamber, 1968). *Ektasophyllum*, *Stelechophyllum*, *Syringopora*, GSC loc. 57803, 17 ft below top of Livingstone Formation, Zone IIIA?.
- AL-57. Mount Inglismaldie, ridgetop southwest of peak, 50°14'30"N., 115°26'30"W. (GSC internal report; see Scott, 1964). *Amplexizaphrentis*, GSC loc. 53467, upper Mount Head Formation (Carnarvon Member?), Zone IV?; *Actinocyathus*, GSC loc. 53468, upper? Etherington Formation, Zone V.
- AL-58. Plateau Mountain, south end of mountain, 50°11'30"N., 114°32'W. (see Macqueen and Bamber, 1968). *Ektasophyllum*, GSC locs. 57815, 57816, 57839, 42 ft below top of Livingstone Formation to 15 ft below top of Baril Member, Mount Head Formation, Zone IIIA; *Siphonodendron*, GSC loc. 57818, 12 ft below top of Livingstone Formation, Zone IIIA; *Lophophyllum?* and *Stelechophyllum*, GSC loc. 57819, 9 ft below top of Livingstone Formation, Zone IIIA.
- AL-59. Oldman River Gap, west side of gap, north side of river, Livingstone Range, 49°52'30"N., 114°22'30"W. (GSC internal report; see Scott, 1964). *Amplexizaphrentis*, GSC loc. 55604, 78 ft below top of Etherington Formation, Zone V?.
- AL-60. Alexander Creek headwaters, Highrock Range, 49°50'30"N., 114°41'W. (GSC internal report; see Scott, 1964). *Amplexizaphrentis*, GSC loc. 51584, lower Etherington Formation, Zone V?.
- AL-61. Daisy Creek headwaters, west side of Livingstone Range, 49°46'N., 114°23'W. (GSC internal report; see Scott, 1964). *Amplexizaphrentis*, GSC loc. 48317, 172 ft above base of Etherington Formation, Zone V.
- AL-62. Turtle Mountain, 49°36'N., 114°25'W. (GSC internal report; see Price, 1962). *Siphonodendron*, GSC loc. 69590, 153 to 158 ft above base of Livingstone Formation, Zone IIIA; *Lophophyllum?*, GSC loc. 47489, 19 ft above base of Baril Member, Mount Head Formation, Zone IIIA?.
- AL-63. Mt. Ptolemy, northwest ridge top, 49°34'30"N., 114°40'W. (GSC internal report; see Scott, 1964). *Schoenophyllum*, GSC locs. 48881, 48886, lower Etherington Formation, Zone V.
- AL-64. West side Mt. Ptolemy, approximately 2 mi N.45°W. of main peak, 49°34'N., 114°39'W. (GSC internal report; see Scott, 1964). *Siphonophyllia*, *Actinocyathus*, GSC loc. 49388, 180 ft below top of Etherington Formation, Zone V.
- AL-65. Amoco G-1 Equity 11-27-32-24(4), subsurface, Zone IIB (GSC internal report; see Boreski, 1978). *Stelechophyllum*, GSC loc. C-46466, 4.5 ft above base of Pekisko Formation; *Sychnoelasma*, GSC loc. C-46463,

- 37 ft above base of Pekisko Formation; *Syringopora*, GSC locs. C-46465, C-46470, C-46472, 10 to 20 ft below top of Banff; *Vesiculophyllum*, GSC locs. C-46462 to C-46464, 12 to 87 ft above base of Pekisko Formation.
- AL-66. Amoco E-1 Equity 6-21-32-24(4), subsurface, all measurements above base of Pekisko Formation unless otherwise indicated, Zone IIB (GSC internal report; see Boreski, 1978). *Amplexizaphrentis*, GSC loc. C-46529, 16 ft; *Lophophyllum?*, GSC loc. C-46517, 71 ft; *Stelechophyllum*, GSC loc. C-46528, 19 ft; *Sychnoelasma*, GSC locs. C-46520, C-46523 to C-46526, C-46530, 10 to 64 ft; *Vesiculophyllum*, GSC locs. C-46515, C-46516, C-46518, C-46519, C-46521, C-46525, C-46527, C-46528, 19 ft above base of Pekisko Formation to 1 ft above base of Shunda Formation.
- AL-67. Pacific Twining 10-23-32-24(4), subsurface, all measurements above base of Pekisko Formation, Zone IIB (GSC internal report; see Boreski, 1978). *Stelechophyllum*, GSC locs. C-46473, C-46478, 11.4 to 33 ft; *Sychnoelasma*, GSC locs. C-46477, C-46479, 2.5 to 35 ft; *Vesiculophyllum*, GSC locs. C-46474, C-46475, C-46477, 30 to 35 ft.
- AL-68. Pan Am CPR-1 Equity 14-7-32-23(4), subsurface, Zone IIB? (GSC internal report; see Boreski, 1978). *Syringopora*, GSC locs. C-46482, C-46484, 3.5 to 61 ft above base of Pekisko Formation; *Vesiculophyllum*, GSC loc. C-46483, 35.5 ft above base of Pekisko Formation.
- AL-69. Pacific Twining 14-6-32-24(4), subsurface, all measurements above base of Pekisko Formation, Zone IIB (GSC internal report; see Boreski, 1978). *Amplexizaphrentis*, GSC locs. C-46512, C-46513, 32 to 33 ft; *Aulostylus*, GSC loc. C-46506, 58 ft; *Stelechophyllum*, GSC loc. C-46509, 38 ft; *Sychnoelasma*, GSC locs. C-46504, C-46508, C-46510 to C-46512, C-46514, 31 to 117 ft; *Vesiculophyllum*, GSC locs. C-46502, C-46503, C-46505, 74 to 140 ft.
- AL-70. MicMac Twining 6-4-32-24(4), subsurface, all measurements above base of Pekisko Formation, Zone IIB (GSC internal report; see Boreski, 1978). *Amplexizaphrentis*, GSC locs. C-46488, C-46489, C-46491, C-46499, C-46500, C-46501, 9 to 93 ft; *Aulostylus*, GSC loc. C-46494, 79 ft; *Sychnoelasma*, GSC locs. C-46491, C-46498, C-46499, 35 to 89 ft; *Syringopora*, GSC loc. C-46484, 3.5 ft; *Vesiculophyllum*, GSC locs. C-46486 to C-46488, C-46490, C-46492 to C-46496, 57 to 99 ft.
- AL-71. Mon Santo Twining 6-35-31-24(4), subsurface (GSC internal report; see Boreski, 1978). *Sychnoelasma*, GSC loc. C-46577, 46 ft above base of Pekisko Formation, Zone IIB.
- AL-72. Mobil Twining 6-20-31-24W4, subsurface, all measurements above base of Pekisko Formation unless otherwise indicated, Zone IIB (GSC internal report; see Boreski, 1978). *Amplexizaphrentis*, GSC locs. C-46535, C-46549, C-46555, C-46557, C-46559, C-46569, C-46573 to C-46576, 1 ft above base to top of Pekisko Formation; *Aulostylus*, GSC loc. C-46565, 38 ft; *Lophophyllum?*, GSC loc. C-46547, 67 ft; *Michelinia*, GSC locs. C-46545, C-46560, 56.5 to 69 ft; *Stelechophyllum*, GSC loc. C-46571, 21.5 ft; *Sychnoelasma*, GSC locs. C-46542 to C-46544, C-46554, C-46560, C-46563, C-46565 to C-46568, C-46570, C-46572, 21 to 72 ft; *Syringopora*, GSC locs. C-46533, C-46534, C-46537, C-46538, C-46560, C-46572, 21 ft above base of Pekisko Formation to 2 ft above base of Shunda Formation; *Vesiculophyllum*, GSC locs. C-46539 to C-46541, C-46543 to C-46545, C-46547 to C-46552, C-46554, C-46556, C-46561, C-46562, C-46564, C-46568, 24 to 102 ft.
- AL-73. Andex et al. Twining 5-23-31-24(4), subsurface, Zone IIB (GSC internal report; see Boreski, 1978). *Stelechophyllum*, GSC locs. C-46458, C-46460, C-46461, 7.5 ft below top of Banff Formation to 1.5 ft above base of Pekisko Formation; *Sychnoelasma*, GSC locs. C-46455, C-46456, C-46458, 1.5 to 36 ft above base of Pekisko Formation; *Syringopora*, GSC locs. C-46457, C-46459, 1 ft below top of Banff Formation to 2.5 ft above base of Pekisko Formation.
- AL-74. Andex et al. Twining 16-16-31-24(4), subsurface (GSC internal report; see Boreski, 1978). *Amplexizaphrentis*, GSC loc. C-46452, 19 ft below top of Banff Formation, Zone IIA or IIB.

SOUTHEASTERN BRITISH COLUMBIA

- SEBC-1. Mount Thompson, 1.6 mi S. 60° W. from peak, 50°43'N., 117°39'30"W., all measurements above base of Milford Group (GSC internal report). *Amplexizaphrentis*, GSC loc. C-236, talus from lower 15 ft, Zone IIID or IV; *Ekvasophyllum*, GSC locs. C-237, C-241, C-242, C-243, C-244, 10 to 35 ft, Zone IIID; *Faberophyllum*, GSC loc. 68709, talus from lower 100 ft, Zone IV?; *Siphonodendron*, GSC locs. 68709, C-237, C-246, C-248, 10 to 80 ft, talus from lower 100 ft, Zones IIID, IV, V; *Pseudodorlodotia*, GSC loc. C-248, 80 ft, Zone IV; *Stelechophyllum?*, GSC locs. C-240, C-242, C-245, C-249, 30 to 40 ft, Zone IIID; *Syringopora*, GSC loc. C-237, 10 ft, Zone IIID.
- SEBC-2. Mount Storelk, southwest corner, Elk Range, 50°32'30"N, 114°59'W. (GSC internal report; see Scott, 1964). *Amplexizaphrentis*, GSC locs. 53401, 53406, 53426, 190 ft below top of Mt. Head Formation to upper Etherington Formation, Zones IV, V; *Siphonophyllia*, GSC locs. 53409, 53410, 110 to 153 ft above base of Etherington Formation, Zone V; *Clisiophyllum*, GSC loc. 53407, 75 ft below top of Mount Head Formation, Zone IV; *Actinocyathus*, GSC loc. 53408, 355 ft above base of Etherington Formation, Zone V; *Schoenophyllum*, GSC loc. 53402, lower Etherington Formation?, Zone V.
- SEBC-3. Mount Loomis, south side, Elk Range, 50°22'30"N, 114°55'W. (GSC internal report). *Amplexizaphrentis*, GSC loc. 53438, 144 ft below top of Etherington Formation, Zone V; *Actinocyathus*, GSC loc. 53435, 313 ft below top of Etherington Formation, Zone V.
- SEBC-4. Ewin Creek, ridgetop 2.2 mi west of Beehive Mountain, 50°04'30"N, 114°42'30"W., all measurements below top of Etherington Formation, Zone V (GSC internal report; see Scott, 1964). *Amplexizaphrentis*, GSC locs. 48333, 48347, 490 to 523 ft; *Siphonodendron*, GSC loc. 48334, between 540 and 570 ft; *Pleurosiphonella*, GSC locs. 48334, 48342, between 540 and 570 ft; *Schoenophyllum*, GSC locs. 48338, 48342, 540 to 612 ft.
- SEBC-5. Tornado Mountain, 2.75 mi northwest of mountain, north side of Line Creek, Highrock Range, 49°59'30"N, 114°42'W., Mount Head Formation (GSC internal report, see Price, 1962). *Acrocyathus*, GSC loc. 40700, 12 ft above base of Carnarvon Member, Zone IV; *Acrocyathus* and

- ?Ekvasophyllum*, GSC loc. 40716, 133.5 ft above base of Marston Member, Zone IIID (upper) or IV (lower); *Amplexizaphrentis*, GSC loc. 40715, 170 ft above base of Carnarvon Member, Zone IV; *Faberophyllum*, GSC locs. 40697, 40703, 40711, 71 to 123 ft above base of Carnarvon Member, Zone IV; *Siphonodendron*, GSC loc. 40696, 343 ft above base of Loomis Member, Zone IIID.
- SEBC-6. Mount Hosmer, northeast spur, 49°43'N., 115°59'W. (GSC internal report; see Scott, 1964). *Amplexizaphrentis*, GSC locs. 49379, 49380, 49385, lower and upper Etherington Formation, Zone V; *Siphonophyllia*, GSC loc. 49385, lower Etherington, Zone V; *Actinocyathus*, GSC loc. 49354, upper Etherington, Zone V; *Michelinia*, GSC locs. 49370, 49371, 49384, lower Etherington, Zone V; *Pleurosiphonella*, GSC locs. 49364, 49365, 49374, lower Etherington, Zone V; *?Syringopora*, GSC loc. 49386, upper Mount Head Formation (Carnarvon Member?), Zone IV.
- SEBC-7. Mount Broadwood, east slope of eastern peak, 49°18'N., 114°58'W. (GSC internal report, see Price, 1962). *Acrocyathus*, GSC locs. 40698, 40702, 297.5 ft above base of Loomis Member to 36.5 ft above base of Marston Member, Mount Head Formation, Zone IIID; *?Amplexizaphrentis*, GSC loc. 40687, 273 ft above base of Etherington Formation, Zone V?; *Siphonophyllia*, GSC loc. 40688, 182 ft above base of Etherington, Zone V; *Ekvasophyllum*, GSC locs. 40694, 40698, 36.5 to 106 ft above base of Marston Member, Mount Head Formation, Zone IIID or IV(lower); *Schoenophyllum*, GSC loc. 40688, 182 ft above base of Etherington Formation, Zone V.
- SEBC-8. Mount Broadwood, southeast corner, 49°17'30"N., 114°58'W. (GSC internal report). *Amplexizaphrentis*, GSC loc. 49362, 275 ft below top of Etherington Formation, Zone V?; *Siphonophyllia*, GSC locs. 49355, 49391, 358 to 360 ft below top of Etherington, Zone V; *Ekvasophyllum?*, GSC loc. 49361, upper Mount Head Formation (Carnarvon Member?), Zone IV?; *Faberophyllum*, GSC locs. 49359, 49360, 49369, upper Mount Head (Carnarvon Member?), Zone IV; *Schoenophyllum*, GSC locs. 49358, 49363, 55586, 340 to 380 ft below top of Etherington Formation, Zone V.
- SASKATCHEWAN
- S-1. Husky-Mic Mac-Canadian Superior Bellegarde No. 1, Lsd 16-19-6-30W1, Tilston beds, Zone IIB? (see Brindle, 1960). *Vesiculophyllum*, 3,249 ft below surface.
- S-2. Canadian Export Gas C. P. Bellegarde No. 5-27, Lsd 5-27-6-31W1, Tilston beds, Zone IIB, (see Brindle, 1960), all measurements in feet below surface. *Amplexizaphrentis*, 3,393.25; *Sychnoelasma*, 3,385; *Vesiculophyllum*, 3,381.75, 3,382, 3,396.75, 3,403.
- S-3. McCarty and Coleman Mobil Crown No. 16-28, Lsd 16-28-6-32W1, Tilston beds, Zone IIB (see Brindle, 1960), all measurements in feet below surface. *Michelinia*, 3,620; *Sychnoelasma*, 3,613.5, 3,615.5; *Syringopora*, 3,623.25; *Vesiculophyllum*, 3,612.75, 3,615.5, 3,623, 3,636, 3,636.25, 3,643.
- S-4. McCarty and Coleman Pederson No. 4-35, Lsd 4-35-7-33W1, Tilston beds, Zone IIB (see Brindle, 1960), all measurements in feet below surface. *Amplexizaphrentis*, 3,630, 3,632.75; *Stelechophyllum*, 3,640; *Sychnoelasma*, 3,630; *Syringopora*, 3,636, 3,637; *Vesiculophyllum*, 3,684.
- S-5. White Rose-Canadian Superior-Souris Cayuga No. 14-31, Lsd 14-31-3-30W1, Frobisher-Alida beds, Zone IIB (see Brindle, 1960), all measurements in feet below surface. *Amplexizaphrentis*, 3,464, 3,474.5; *Sychnoelasma*, 3,463.75, 3,466.5, 3,481; *Vesiculophyllum*, 3,471, 3,473, 3,480.75, 3,482, 3,486.5.
- S-6. Imperial Rosebank No. 16-1M, Lsd 16-1-4-32W1, Frobisher-Alida beds, Zone IIB (see Brindle, 1960), all measurements in feet below subsurface. *Amplexizaphrentis*, 3,712, 3,717; *Sychnoelasma*, 3,716.5; *Vesiculophyllum*, 3,706, 3,725, 3,744.5.
- S-7. Imperial Seymour No. 4-19-3-31, Lsd 4-19-3-31W1 (see Brindle, 1960). *Vesiculophyllum*, 3,774.75 ft below surface, Frobisher-Alida beds, Zone IIB?
- S-8. Imperial-Canadian Superior Carnduff No. 3-27-2-33, Lsd 3-27-2-33W1, Frobisher-Alida beds, Zone IIB (see Brindle, 1960), all measurements in feet below surface. *Sychnoelasma*, 4,216, 4,216.5; *Vesiculophyllum*, 4,215.25, 4,216, 4,224, 4,226.5.
- S-9. Imperial-Royalite-Hudson's Bay Auburnton No. 1-2-5-1, Lsd 1-2-5-1W2, Zone IIB (see Brindle, 1960), all measurements in feet below surface. *Amplexizaphrentis*, 4,334.5, 4,343.25, 4,389.25, Tilston beds; *Lophophyllum?*, 4,332.25, 4,336, Tilston beds; *Michelinia*, 4,334, 4,338.5, Tilston beds; *Sychnoelasma*, 3,957, Frobisher-Alida beds, 4,332, 4,341.5, 4,380, 4,389.25, Tilston beds; *Syringopora*, 4,346.5, Tilston beds; *Vesiculophyllum*, 4,329, 4,333, 4,340, 4,343, Tilston beds.
- S-10. Imperial-Tidewater Carlyle Crown No. 1, Lsd 16-23-7-3W2, Zone IIB? (see Brindle, 1960), all measurements in feet below surface. *Amplexizaphrentis*, 3,891.75, 4,604.5, Souris Valley and Frobisher-Alida beds; *Vesiculophyllum*, 3,876.5, 3,885, 3,889.5, Frobisher-Alida beds.
- S-11. British American-Canadian Devonian Quinn No. 1-34, Lsd 1-34-4-3W2 (see Brindle, 1960). *Vesiculophyllum*, 4,610 ft below surface, Midale beds, Zone IIB or IIIA.
- S-12. British American-Union Pickard No. 16-27, Lsd 16-27-3-4W2 (see Brindle, 1960). *Amplexizaphrentis*, 4,761, 4,763.25, 4,763.5, 4,764, and 4,765 ft below surface, Frobisher-Alida beds, Zone IIB?
- S-13. Imperial Dalesboro No. 4-9M-6-3, Lsd 4-9-6-3W2 (see Brindle, 1960). *Vesiculophyllum*, 4,159 ft below surface, Frobisher-Alida beds, Zone IIB?
- S-14. California Standard Frobisher No. 5-21, Lsd 5-21-2-4W2 (see Brindle, 1960). *Amplexizaphrentis*, *?Vesiculophyllum*, 5,270 ft below surface, Frobisher-Alida beds, Zone IIB?
- S-15. Tidewater-Imperial Lampman Crown No. 1, Lsd 5-28-6-6W2 (see Brindle, 1960). *Sychnoelasma*, 4,321.5 ft below surface, Frobisher-Alida beds, Zone IIB.
- S-16. Sohio Stoughton No. 4-13, Lsd 13-4-9-8W2, Frobisher-Alida beds, Zone IIB (see Brindle, 1960), all measurements in feet below surface. *Sychnoelasma*, 4,080.5, 4,083.5; *Vesiculophyllum*, 4,079.5, 4,080.5.
- S-17. Western Leaseholds North Midale No. 3-5, Lsd 3-5-7-10W2 (see Brindle, 1960). *Syringopora*, 4,438 ft below surface, Midale beds, Zone IIB or IIIA.
- S-18. Shell Martin No. 13-5, Lsd 13-5-6-10W2 (see Brindle, 1960). *Syringopora*, 4,677 ft below surface, Midale beds, Zone IIB?

- S-19. Gridoil Colgate No. 12-27, Lsd 12-27-5-14W2 (see Brindle, 1960). *Vesiculophyllum*, *Syringopora*, 5,008 ft below surface, Frobisher-Alida beds, Zone IIB?
- S-20. Central-Del Rio Ratcliffe No. 4-20, Lsd 4-20-1-15W2 (see Brindle, 1960). *Vesiculophyllum*, 6,512, 6,530.5, and 6,543.5 ft below surface, Ratcliffe beds, Zone IIB?
- S-21. Socony-Central-Del Rio Ratcliffe No. 2, Lsd 12-30-1-15W2 (see Brindle, 1960), all measurements in feet below surface. *Amplexizaphrentis*, 6,538, Midale beds, Zone IIB or IIIA; *Syringopora*, 6,486, 6,498.5, 6,506 to 6,506.5, 6,526, Ratcliffe beds, 6,536, Midale beds, Zone IIB or IIIA; *Vesiculophyllum*, 6,498.5, 6,514, 6,521, Ratcliffe beds, 6,545.5, Midale beds, Zone IIB or IIIA.
- S-22. White Rose-Compagnie Francaise-Mobil Lake Alma No. 8-22, Lsd 8-22-2-17W2 (see Brindle, 1960). *Syringopora*, 6,456 ft below surface, Ratcliffe beds, Zone IIB or IIIA.

LOCALITIES NOT REPRESENTED BY MEASURED SECTIONS

SOUTHWEST DISTRICT OF MACKENZIE

- SWDM-1. Liard River, east bank, 5 mi above Flett Rapids, 60°37'30"N., 123°30'30"W. (see Sutherland, 1958, fossil locality 34, p. 39). *Amplexizaphrentis*, *Siphonodendron*, GSC loc. 16603, Flett Formation, stratigraphic level unknown, Zone IIB?

NORTHEASTERN BRITISH COLUMBIA

- NEBC-1. Chlotopecta Creek, 58°28'N., 123°57'W. *Ekvasophyllum*, GSC locs. 66691, 66692, upper 5 ft of Prophet Formation, Zone IIIC or IIID (lower).
- NEBC-2. Mount Brewster East, northeast ridge, 56°16'N., 123°12'W. (see Irish, 1963, p. 375). *Ekvasophyllum*, GSC loc. 46993, middle Prophet Formation, Zone IIIB or IIIC.
- NEBC-3. Mount Brewster West, northwest ridge, 56°15'N., 123°16'W. (see Irish, 1963, p. 375). *Siphonodendron*, *Zaphriphyllum*, GSC loc. 46883, middle Prophet Formation, Zone IIIB or IIIC.
- NEBC-4. Mount Brewster, 3 mi north of Mount Brewster Peak, 56°14'N., 123°10'W. *Ekvasophyllum*, GSC loc. C-11706, top 10 ft of Prophet Formation, Zone IIID or lower Zone IV.
- NEBC-5. Black Bear Valley, 2 mi west of highest point on Black Bear Ridge, 56°08'N., 123°06'W. (see Irish, 1963, p. 376). *Ekvasophyllum*?, GSC loc. 36936, within upper 400 ft of Prophet Formation (member C?), Zone IIID?
- NEBC-6. Fossil Point, north bank of Peace River, 56°01'N., 123°08'W. (see Sutherland, 1958, p. 39, 94; Lambe, 1899, p. 220). *Stelechophyllum*?, upper Prophet Formation, member C?, Zone IIID?
- NEBC-7. Narraway River, ridge 3 mi north of Narraway River, 54°13'N., 120°23'W. *Dorlodotia*?, *Sychnoelasma*, *Vesiculophyllum*, GSC loc. C-7425, upper Shunda Formation, Zone IIB.

ALBERTA

- AL-1. The Rajah, 2 mi south of Snake Indian River, 53°17'N., 118°31'W. (GSC internal report). *Stelechophyllum*, GSC loc. 42144, uppermost Banff Formation, Zone IIB.

- AL-2. Rocky Pass, 52°51'N., 117°16'30"W. (see Kelly, 1942, p. 357). *Stelechophyllum*, probably from upper Pekisko Formation, Zone IIB.
- AL-3. Mount Rae, northwest slope, 50°37'40"N., 114°59'35"W. (see McGugan, 1983). *Palaeacis*, talus specimen from upper Mount Head Formation or lower Etherington Formation, Zone IV or V.

SOUTHEASTERN BRITISH COLUMBIA

- SEBC-1. Alexander Creek headwaters, 4 mi on bearing N.22°W. from Race Horse Mountain, all occurrences in upper Mount Head Formation (GSC internal report; see Price, 1962). *Ekvasophyllum*, GSC loc. 42820, Zone IIID (upper) or IV (lower); *Faberophyllum*, GSC loc. 42811, Zone IV; *Siphonodendron*, GSC locs. 42821, 42822, Zone IIID; *Syringopora*, GSC loc. 42822, Zone IIID.
- SEBC-2. Playsoo Ridge, 3.5 mi on bearing 253° from mouth of Harvey Creek, MacDonald Range (GSC internal report; see Price, 1962). *Siphonodendron*, GSC loc. 36605, lower Etherington Formation, Zone V.
- SEBC-3. Lodgepole Creek, ridge between headwaters of Lodgepole Creek (south fork) and Twentynine Mile Creek, MacDonald Range (GSC internal report; see Price, 1962). *Ekvasophyllum*, *Acroclyathus*?, GSC loc. 36602, 55 ft below top of Carnarvon Member, Mount Head Formation, Zone IV.
- SEBC-4. Taylor Range, 12,000 ft on bearing 230° from Flathead Pass (GSC internal report; see Price, 1962). *Siphonodendron*, GSC loc. 47495, approximately 15 ft above base of Etherington Formation, Zone V.
- SEBC-5. Wilson Creek, north side of creek, 6,500 ft downstream from mouth of Telford Creek (GSC internal report; see Price, 1962). *Siphonophyllia*, GSC loc. 42813, middle Etherington Formation, Zone V.
- SEBC-6. Bighorn Creek, 8.15 mi from mouth of creek on bearing 81°, MacDonald Range (GSC internal report; see Price, 1962). *Faberophyllum*, GSC loc. 40699, approximately 50 ft below top of Carnarvon Member, Mount Head Formation, Zone IV.
- SEBC-7. Mount Darrah, west slope, Flathead Range, 49°28'30"N., 114°37'W. (see Nelson, 1960, p. 122). *Schoenophyllum*, 160 ft above base of Etherington Formation, Zone V.

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PLATES 1-10

Contact photographs of the plates in this report are available, at cost, from the U.S. Geological Survey Library, Federal Center, Denver, CO 80225.

PLATE 1

FIGURES 1,2. *Amplexocarinia* sp. (p.17).

USGS loc. 13872-PC, Section M-9, Lodgepole Limestone, Montana, Zone IC.

1. Side view of broken etched silicified mature specimen, $\times 2$, USNM 119780.
2. Calicular view of etched silicified neanic specimen, $\times 2$, USNM 119779.

3,4. *Amplexus* sp. (p.17).

USGS loc. 13872, Section M-9, Lodgepole Limestone, Montana, Zone IC.

3. Transverse thin section, $\times 2$, USNM 119771.
4. Longitudinal thin section, $\times 2$, USNM 119771.

5,6. *Acrocyathus arizelum* (Crickmay) (p.16).

GSC loc. 57938, Section AL-49, Mount Head Formation, Alberta, Zone IV.

5. Transverse thin section, $\times 2$, GSC type no. 67849a.
6. Longitudinal thin section, $\times 2$, GSC type no. 67849b.

7,8. *Amplexizaphrentis persimilis* (Easton and Gutschick) (p.16).

Redwall Limestone, Arizona, Zone II.

7. Longitudinal thin section, $\times 3$, MNA G2.4075, Section A-18.
8. Transverse thin section, $\times 3$, holotype, MNA G2.4078, Section A-23.

9. *Ankheasma typicum* Sando (p.17).

USGS loc. 17722-PC, Section U-4, Brazer Dolomite, Utah, Zone IIIA. Calicular view of etched silicified specimen, holotype, USNM 120201.

10,11. *Acrocyathus girtyi* (Hayasaka) (p.16).

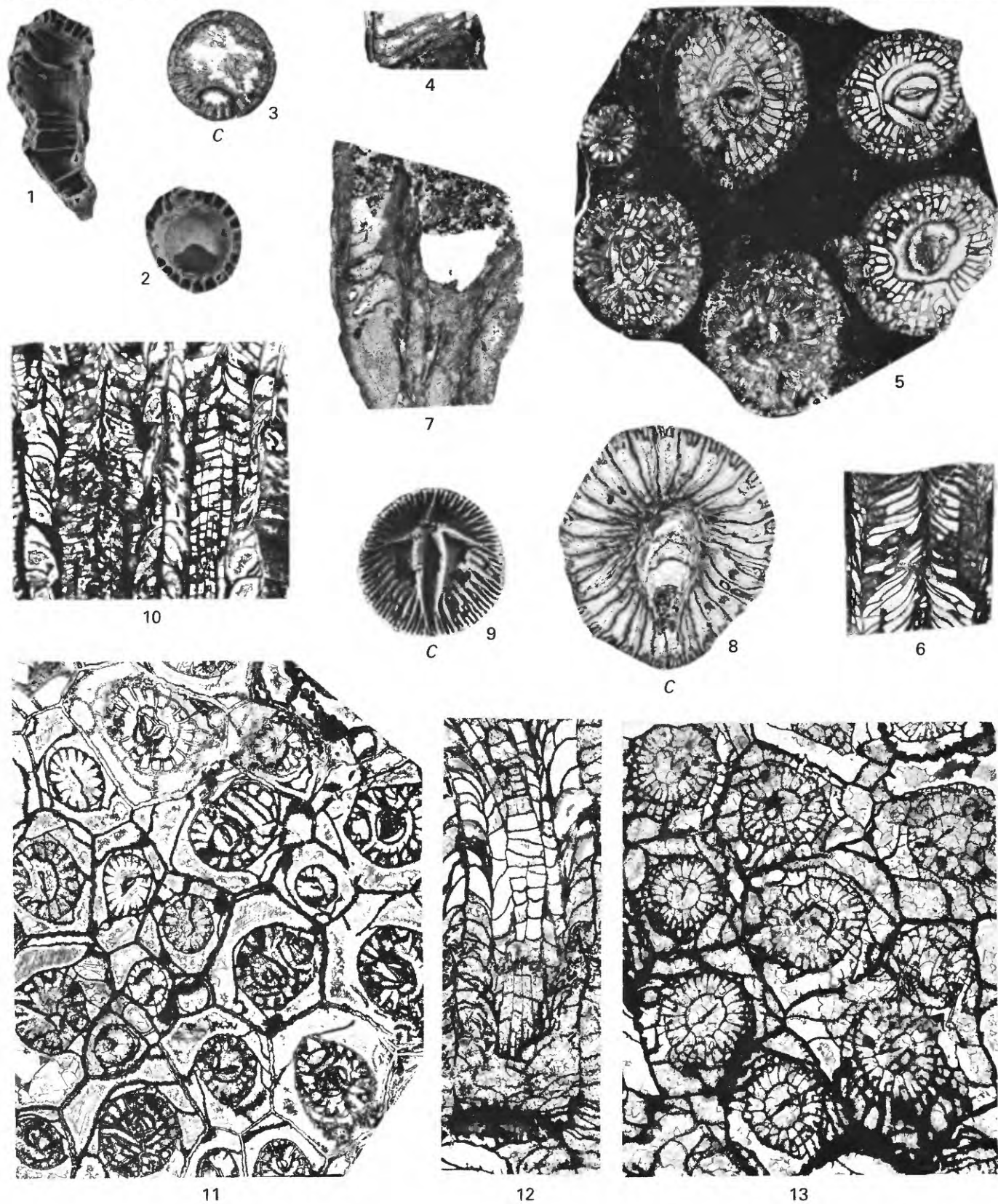
USGS loc. 4801H-PC (green label), Locality U-21, Monroe Canyon Limestone equivalent, Utah, Zone IIID.

10. Longitudinal thin section, $\times 3$, holotype, USNM 120243b.
11. Transverse thin section, $\times 3$, holotype, USNM 120243a.

12,13. *Aulostylus tubiferus tubiferus* (Hayasaka) (p.18).

USGS loc. 5894-PC, Section M-23, Mission Canyon Limestone, Montana, Zone IIB.

12. Longitudinal thin section, $\times 5$, holotype, USNM 120247b.
13. Transverse thin section, $\times 5$, holotype, USNM 120247a.



ACROCYATHUS, AMPLEXIZAPHRENTIS, AMPLEXOCARINIA, AMPLEXUS, ANKHELASMA, AULOSTYLUS

PLATE 2

FIGURES 1,2. *Canadiphyllum* sp. (p.18).

USGS loc. 22939-PC, Section U-17, Deseret Limestone, Utah, Zone IIID.

1. Calicular view of etched silicified specimen having broken calice, $\times 1$, USNM 309845.
2. Alar view of same specimen, $\times 1$.

3. *Beaumontia* sp. (p.18).

USGS loc. 16811-PC, Section U-3, Lodgepole Limestone, Utah, Zone IB. Side view of etched silicified specimen, $\times 2$, USNM 309842.

4,5. *Barytichisma amsdenense* (Branson and Greger) (p.18).

Locality WY-16, Amsden Formation, Wyoming, Zone VI.

4. Longitudinal thin section, $\times 2$, paralectotype, UM 2663.
5. Transverse thin section, $\times 2$, lectotype, UM 2663.

6,7. *Guerichophyllum* sp. (p.22).

USGS loc. 17996-PC, Locality M-18, Allan Mountain Limestone, Montana, Zone IC.

6. Longitudinal thin section, $\times 2$, USNM 309852b.
7. Transverse thin section, $\times 2$, USNM 309852a.

8,9. *Caninia* sp. (p.19).

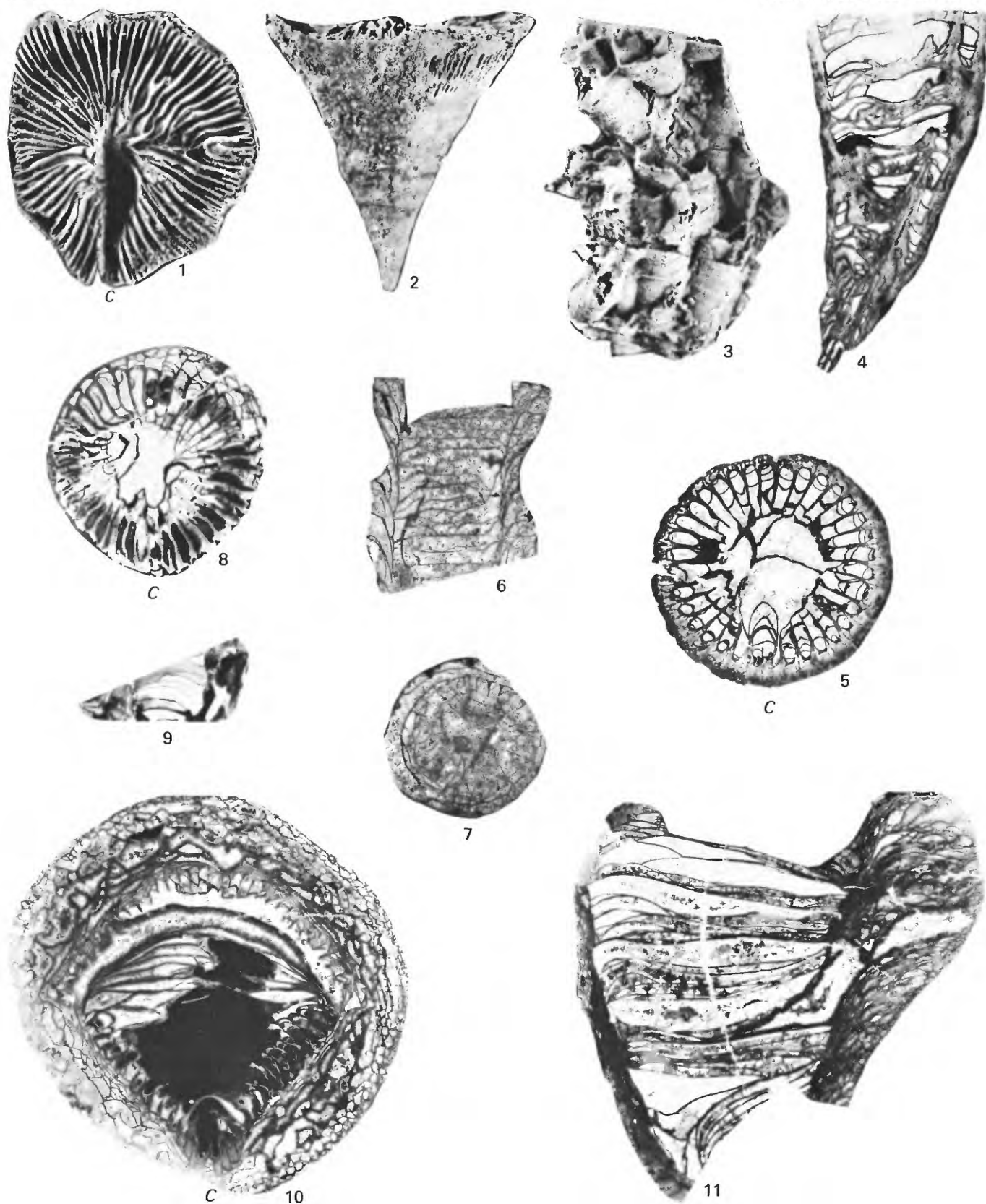
USGS loc. 13903-PC, Section M-9, Charles Formation, Montana, Zone IIIA.

8. Transverse thin section, $\times 2$, USNM 119760.
9. Longitudinal thin section, $\times 2$, USNM 119760.

10,11. *Siphonophyllia excentrica* (Meek) (p.28).

USGS loc. 17498-PC, Section M-23, Big Snowy Formation, Montana, Zone VB.

10. Transverse thin section, $\times 1$, topotype, USNM 144795a.
11. Longitudinal thin section, $\times 1$, topotype, USNM 144796A.



BARYTICHISMA, BEAUMONTIA, CANADIPHYLLUM, CANINIA, GUERICHOPHYLLUM, SIPHONOPHYLLIA

PLATE 3

FIGURES 1,2. *Clisiophyllum* sp. (p.19).

USGS loc. 16952-PC, Section U-1, Monroe Canyon Limestone, Utah, Zone IV.

1. Longitudinal thin section, $\times 2$, USNM 309853b.

2. Transverse thin section, $\times 2$, USNM 309853a.

3,4. *Cyathaxonia tantilla* (Miller) (p.20).

USGS loc. 16803-PC, Section U-3, Lodgepole Limestone, Utah, Zone IB.

3. Transverse thin section, $\times 10$, USNM 222532b.

4. Longitudinal thin section, $\times 7$, USNM 222530.

5. *Cleistopora placenta* (White) (p.19).

USGS loc. 13872-PC, Section M-9, Lodgepole Limestone, Montana, Zone IC. Top view, $\times 1$, USNM 119790.

6,7. "*Diphyphyllum*" sp. (p.20).

USGS loc. 20683-PC, Section M-21, Mission Canyon Limestone, Montana, Zone IIIA.

6. Longitudinal thin section, $\times 2$, USNM 309854b.

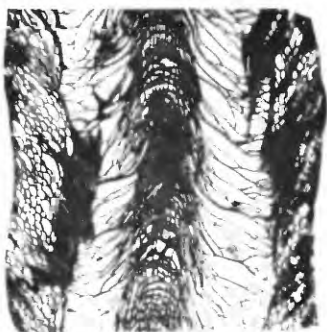
7. Transverse thin section, $\times 2$, USNM 309854a.

8,9. *Dorlodotia? inconstans* (Easton and Gutschick) (p.20).

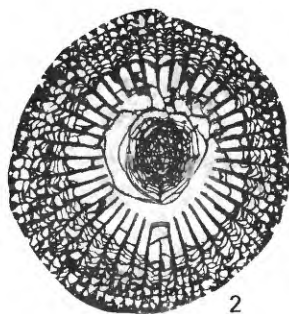
Section A-13, Redwall Limestone, Arizona, Zone IIIB.

8. Longitudinal thin section, $\times 2$, USNM 142240a.

9. Transverse thin section, $\times 2$, USNM 142240b.



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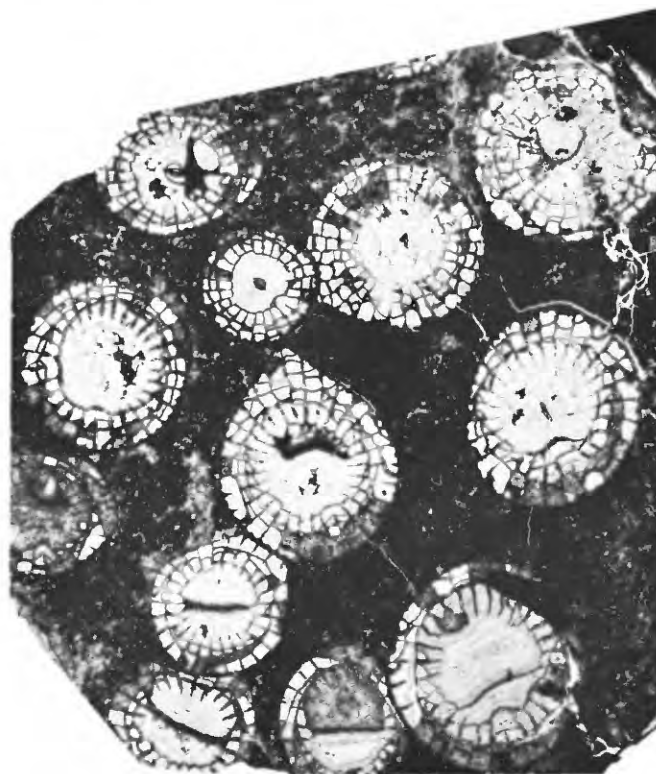
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CLEISTOPORA, CLISIOPHYLLUM, CYATHAXONIA, DORLODOTIA?, "DIPHYPHYLLUM"

PLATE 4

FIGURES 1,2. *Faberophyllum* sp. (p.21).

USGS loc. 18700-PC, Section I-3, Monroe Canyon Limestone, Idaho, Zone IV.

1. Transverse thin section, $\times 2$, USNM 309855a.

2. Longitudinal thin section, $\times 2$, USNM 309855b.

3,4. *Ekvasophyllum* cf. *E. inclinatum* Parks (p.21).

Section A-6, Redwall Limestone, Arizona, Zone IIIC.

3. Transverse thin section, $\times 2$, USNM 142227c.

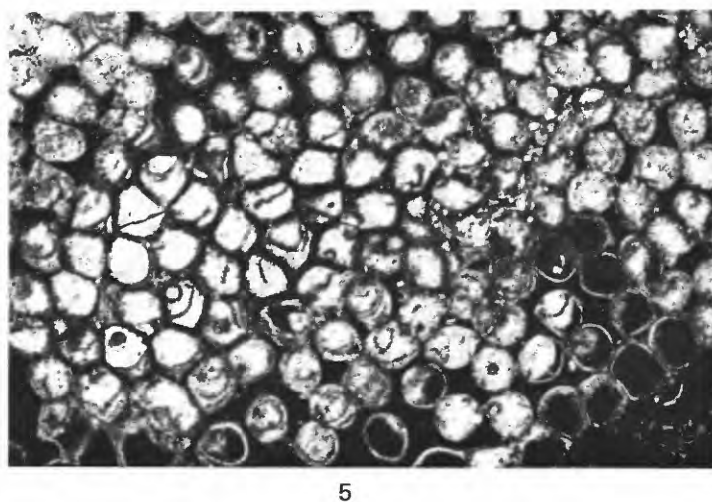
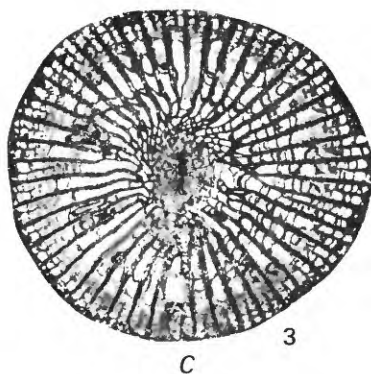
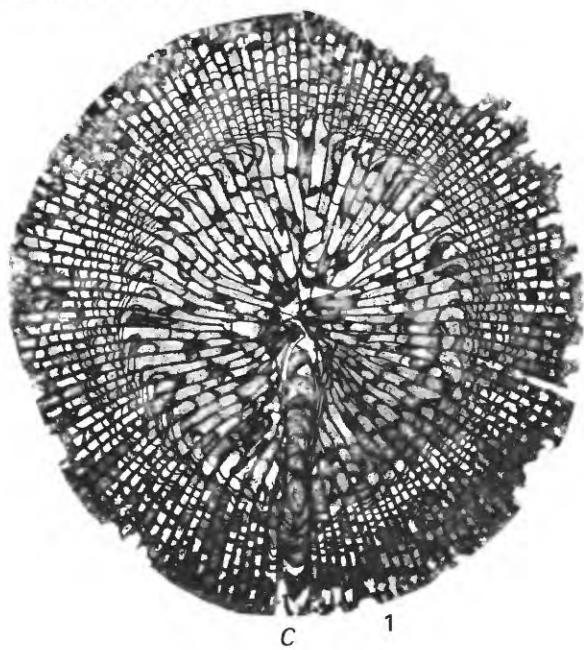
4. Longitudinal thin section, $\times 2$, USNM 142227a.

5,6. *Duncanopora duncanae* Sando (p.21).

USGS loc. 22982-PC, Section WY-5, Amsden Formation, Wyoming, Zone VB.

5. Transverse thin section, holotype, $\times 4$, USNM 165184a.

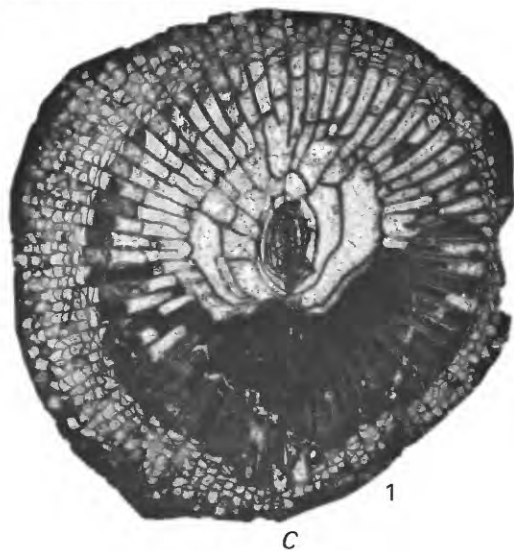
6. Longitudinal thin section, holotype, $\times 4$, USNM 165184b.



DUNCANOPORA, EKVASOPHYLLUM, FABEROPHYLLUM

PLATE 5

- FIGURES 1,2. *Koninckophyllum* cf. *K. magnificum* Thomson and Nicholson (p.22).
GSC loc. 66421, Section NEBC-23, Prophet Formation, British Columbia, Zone IV.
1. Transverse thin section, $\times 2$, GSC type no. 67850a.
2. Longitudinal thin section, $\times 2$, GSC type no. 67850b.
3. *Hapsiphyllum* sp. (p.22).
USGS loc. 27264-PC, Section I-15, Aspen Range Formation, Idaho, Zone IIID. Transverse thin section, $\times 4$, USNM 309851.
4. *Liardiphyllum hagei* Sutherland (p.23).
GSC loc. 16622, Section SWDM-10, Flett Formation, British Columbia, Zone IIIA. Transverse thin section, $\times 2$, holotype, GSC type no. 10571.
- 5,6. *Siphonodendron "whitneyi"* of Meek (p.27).
USGS loc. 21982-PC, Locality I-39, Scott Peak Formation, Idaho, Zone IIID.
5. Longitudinal thin section, $\times 2$, USNM 309858b.
6. Transverse thin section, $\times 2$, USNM 309858a.
- 7,8. *Siphonodendron oculinum* Sando (p.27).
Section A-13, Redwall Limestone, Arizona, Zone IIIA.
7. Transverse thin section, $\times 2$, holotype, USNM 143242a.
8. Longitudinal thin section, $\times 2$, holotype, USNM 143242b.

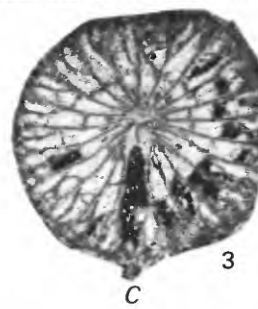


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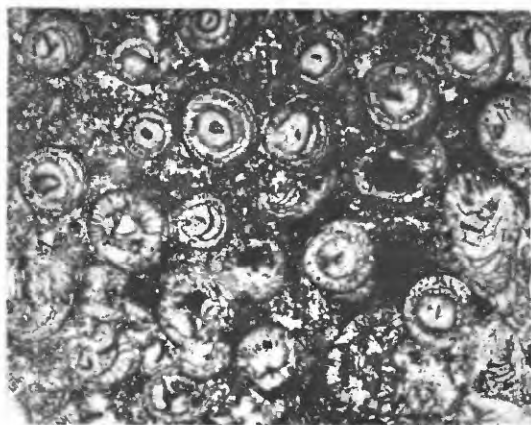
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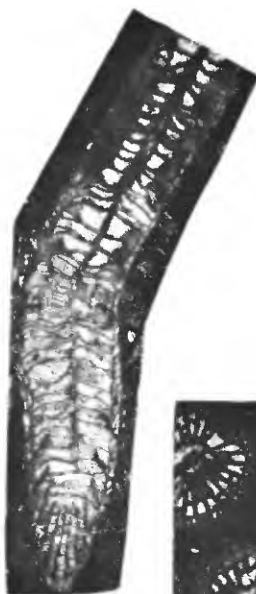


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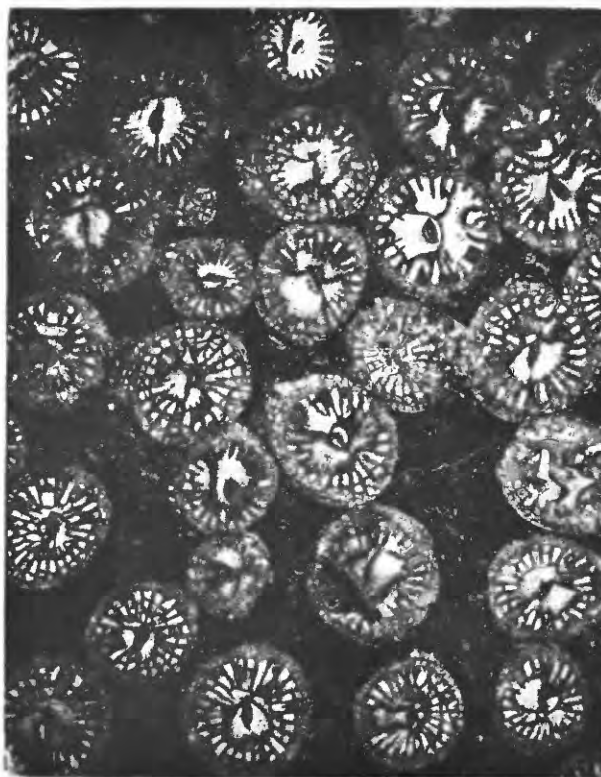
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HAPSIPHYLLUM, KONINCKOPHYLLUM, LIARDIPHYLLUM, SIPHONODENDRON

PLATE 6

FIGURES 1,2. *Siphonodendron warreni* Nelson (p.27).

GSC loc. 58126, Section AL-38, Mount Head Formation, Alberta, Zone IIID.

1. Transverse thin section, $\times 2$, GSC type no. 67851a.

2. Longitudinal thin section, $\times 2$, GSC type no. 67851b.

3. *Metriophyllum* sp. (p.23).

USGS loc. 18635-PC, Section I-3, Lodgepole Limestone, Idaho, Zone IB. Transverse thin section, $\times 6$, USNM 309849.

4. *Lophophyllum?* sp. (p.23).

USGS loc. 15265-PC, Section M-4, Lodgepole Limestone, Montana, Zone II. Transverse thin section, $\times 2$, USNM 309846.

5,6. *Siphonodendron sinuosum* (Kelly) (p.27).

Section AL-29, Mount Head Formation, Alberta, Zone IIIA or IIIB.

5. Longitudinal thin section, $\times 2$, lectotype, GSC type no. 8913.

6. Transverse thin section, $\times 2$, same specimen.

7,8. *Siphonodendron mutabile* (Kelly) (p.27).

GSC loc. 62002, Section AL-28, Livingstone Formation, Alberta, Zone IIB.

7. Longitudinal thin section, $\times 2$, GSC type no. 67852a.

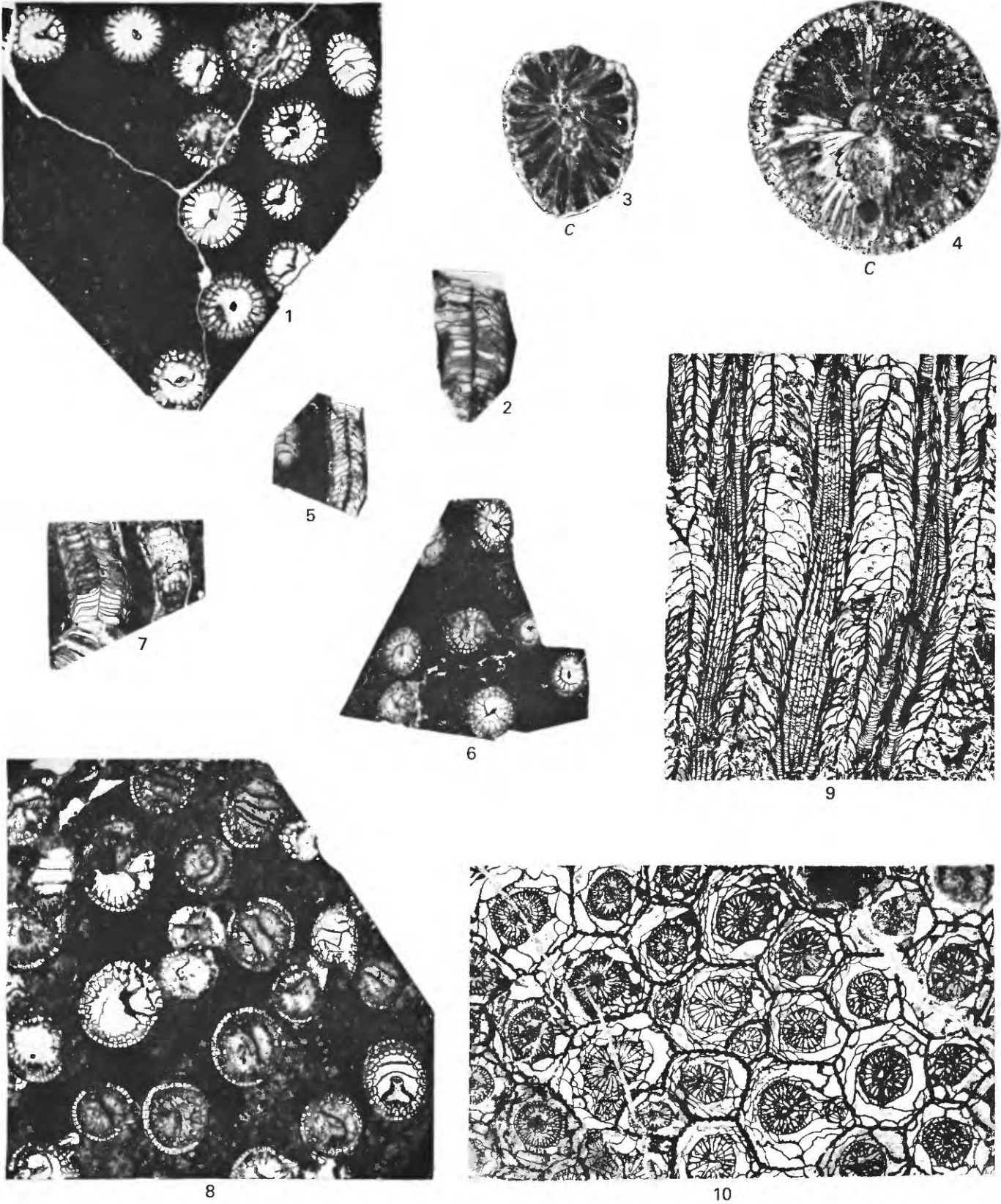
8. Transverse thin section, $\times 2$, GSC type no. 67852b.

9,10. *Actinocyathus stelcki* (Nelson) (p.16).

USGS loc. 17906-PC, Section WY-3, Amsden Formation, Wyoming, Zone VB.

9. Longitudinal thin section, $\times 2$, USNM 165171b.

10. Transverse thin section, $\times 2$, USNM 165171a.



ACTINOCYATHUS, LOPHOPHYLLUM?, METRIOPHYLLUM, SIPHONODENDRON

PLATE 7

FIGURES 1,2. *Multithecopora amsdenensis* Sando (p. 24).

USGS loc. 17907-PC, Section WY-3, Amsden Formation, Wyoming, Zone VB.

1. Transverse thin section, $\times 4$, USNM 165177a.
2. Longitudinal thin section, $\times 4$, USNM 165177b.

3,4. *Palaeacis cuneiformis* Haime (p. 25).

USGS loc. 18683-PC, Section I-3, Little Flat Formation, Idaho, Zone IIID.

3. Side view of etched silicified specimen, $\times 2$, USNM 309844.
4. Top view of same specimen, $\times 2$.

5. *Palaeacis* sp. (p. 25).

USGS loc. 16813-PC, Section U-3, Lodgepole Limestone, Utah, Zone IB. Top view of etched silicified specimen, $\times 4$, USNM 309843.

6,7. *Michelinia expansa* White (p. 24).

Section A-30, Redwall Limestone, Arizona, Zone II.

6. Transverse thin section, $\times 2$, USNM 42244b.
7. Longitudinal thin section, $\times 2$, USNM 42244a.

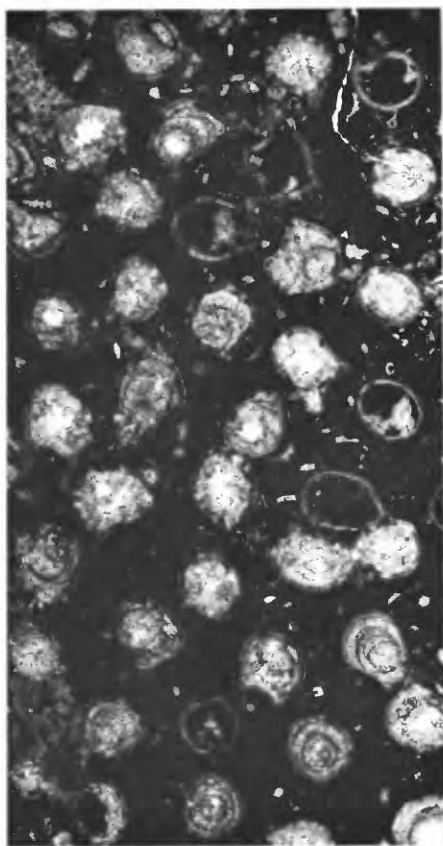
8. *Neaxon?* sp. (p. 24).

USGS loc. 17356-PC, Section M-19, Lodgepole Limestone, Montana, Zone IB. Calicular view of etched silicified broken specimen, $\times 4$, USNM 309859.

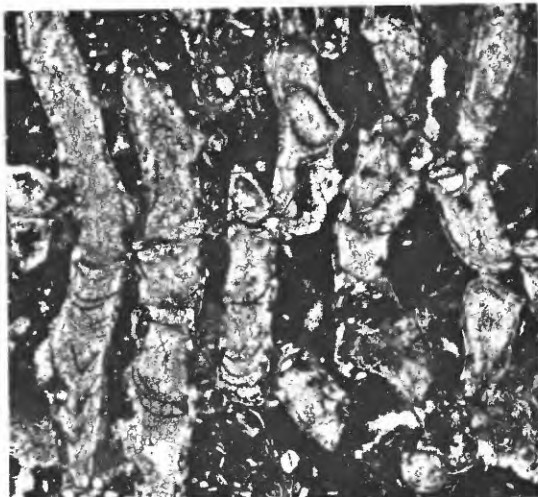
9,10. *Petalaxis simplex* (Hayasaka) (p. 25).

USGS loc. 5893-PC, Locality U-22, Monroe Canyon Limestone, Utah, Zone IV.

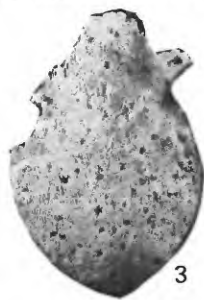
9. Longitudinal thin section, $\times 2$, USNM 120249b.
10. Transverse thin section, $\times 2$, USNM 120249a.



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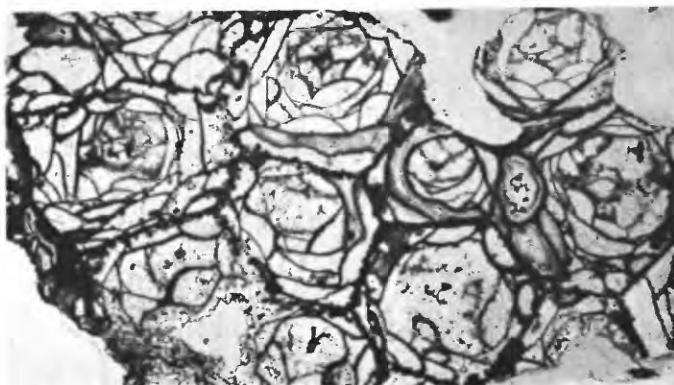
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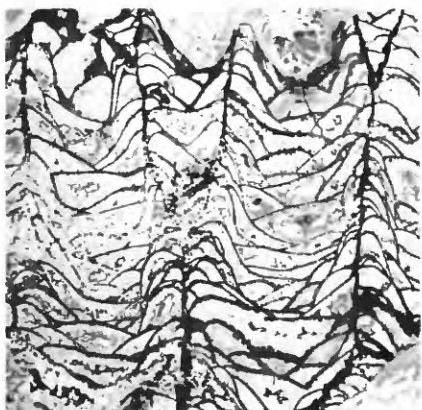
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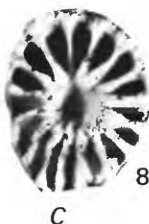
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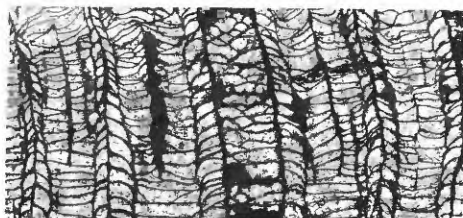


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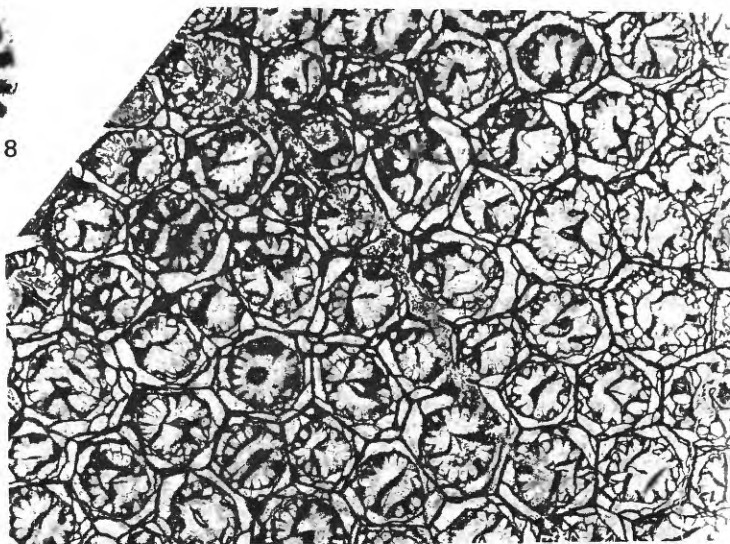


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MICHELINIA, MULTITHECOPORA, NEAXON?, PALAEACIS, PETALAXIS

PLATE 8

FIGURES 1,2. *Schoenophyllum* sp. (p.27).

USGS loc. 20017-PC, Locality U-23, Monroe Canyon Limestone, Utah, Zone VA.

1. Longitudinal thin section, $\times 2$, USNM 309857b.

2. Transverse thin section, $\times 2$, USNM 309857a.

3,4. "*Pseudodorlodotia*" sp. (p.26).

USGS loc. 19895-PC, Section I-9, Scott Peak Formation, Idaho, Zone IV.

3. Transverse thin section, $\times 1$, USNM 309856a.

4. Longitudinal thin section, $\times 1$, USNM 309856b.

5. *Rhopalolasma* sp. (p.26).

USGS loc. 26625-PC, Section U-7, Deseret Limestone, Utah, Zone IIIA. Transverse thin section, $\times 2$, USNM 309850.

6. *Rotiphyllum* sp. (p.27).

USGS loc. 13926-PC, Section M-8, Lodgepole Limestone, Montana, Zone II. Transverse thin section, $\times 6$, USNM 119772.

7,8. *Pleurosiphonella drummondi* (Nelson) (p.25).

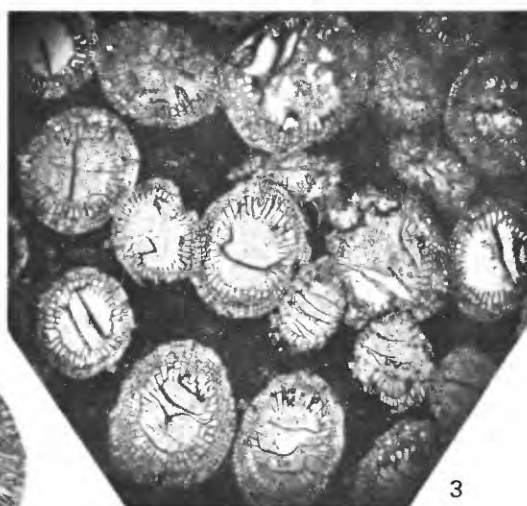
USGS loc. 23002-PC, Section WY-6, Amsden Formation, Wyoming, Zone VB.

7. Transverse thin section, $\times 4$, USNM 165174a.

8. Longitudinal thin section, $\times 4$, USNM 165174c.



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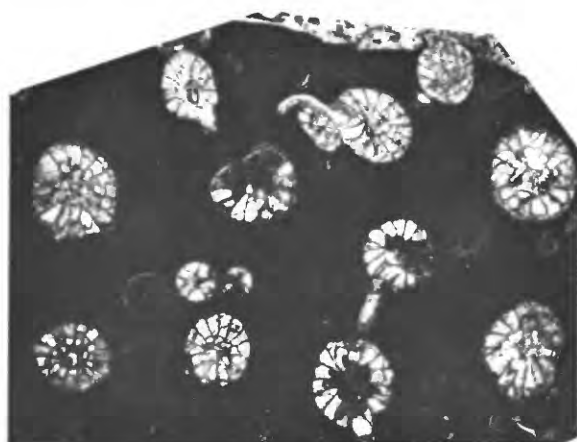


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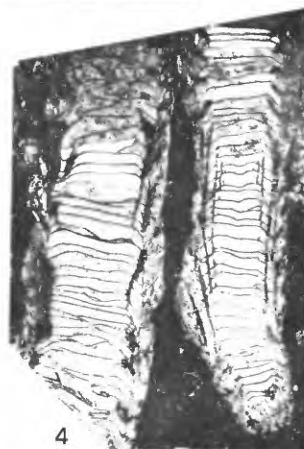


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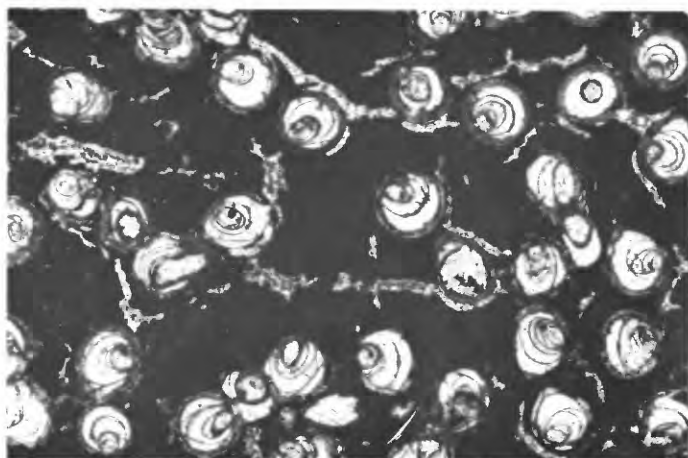
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PLEUROSIPHONELLA, "PSEUDODORLODOTIA," *RHOPALOLASMA*, *ROTIPHYLLUM*, *SCHOENOPHYLLUM*

PLATE 9

FIGURES 1,2. *Syringopora* sp. (p.29).

Section A-3, Redwall Limestone, Arizona, Zone II.

1. Transverse thin section, $\times 2$, USNM 142245b.
2. Longitudinal thin section, $\times 2$, USNM 142245a.

3,4. *Sciophyllum adjunctivum* (White) (p.27).

Locality I-40, Monroe Canyon Limestone, Idaho, Zone IIID?.

3. Transverse thin section, $\times 2$, lectotype, USNM 144786a.
4. Longitudinal thin section, $\times 2$, lectotype, USNM 144786b.

5. *Sychnoelasma subcrassum* (Easton and Gutschick) (p.29).

Section A-24, Redwall Limestone, Arizona, Zone II. Transverse thin section, $\times 3$, USNM 142217c.

6,7. *Stelechophyllum banffense* (Warren) (p.28).

GSC loc. 59368, Section NEBC-5, Debolt Formation, British Columbia, Zone IIID.

6. Transverse thin section, $\times 3$, GSC type no. 67853a.
7. Longitudinal thin section, $\times 3$, GSC type no. 67853b.

8,9. *Stelechophyllum micrum* (Kelly) (p.28).

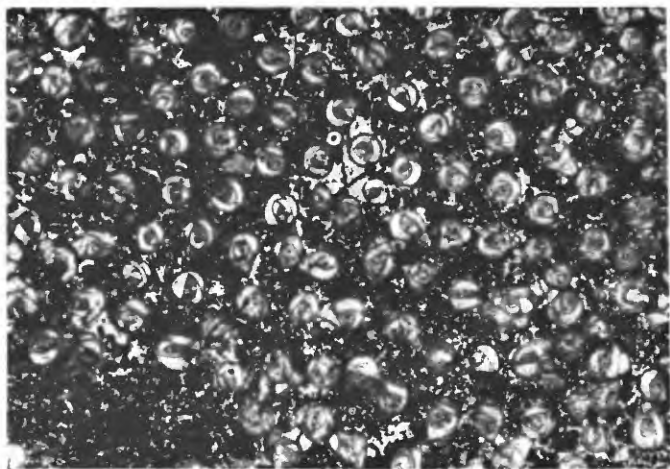
Locality AL-2, Pekisko Formation, Alberta, Zone IIB.

8. Longitudinal thin section, $\times 4$, holotype, GSC type no. 9648.
9. Transverse thin section, $\times 4$, holotype, GSC type no. 9648.

10,11. *Stelechophyllum microstylum* (White) (p.28).

USGS loc. 490-PC, Section U-1, Lodgepole Limestone, Utah, Zone II.

10. Longitudinal thin section, $\times 2$, USNM 120244b.
11. Transverse thin section, $\times 2$, USNM 120244a.



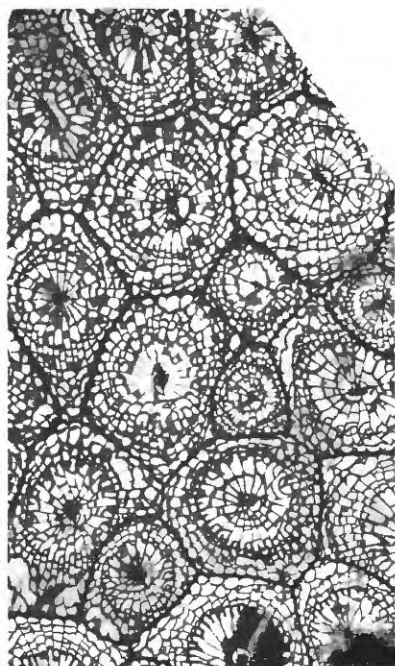
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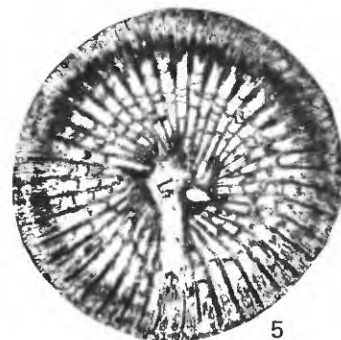
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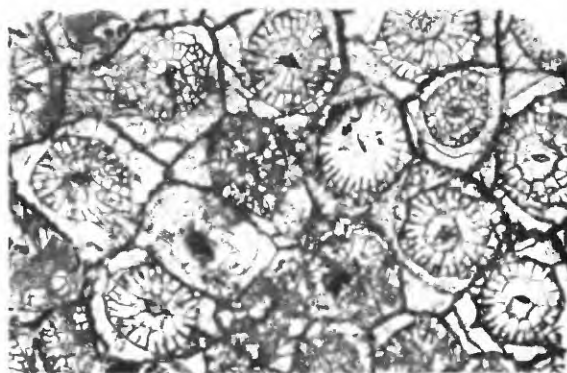
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10



11

SCIOPHYLLUM, STELECHOPHYLLUM, SYCHNOELASMA, SYRINGOPORA

PLATE 10

FIGURES 1,2. "*Thysanophyllum*" *astreiforme* (Warren) (p.30).

Section AL-29, Mount Head Formation, Alberta, Zone IV.

1. Transverse thin section, $\times 2$, lectotype, GSC type no. 8911.

2. Longitudinal thin section, $\times 2$, lectotype, GSC type no. 8911.

3,4. *Zaphriphyllum* sp. (p.31).

USGS loc. 21674-PC and 21677-PC, Section WY-12, Madison Limestone, Wyoming, Zone IIIA.

3. Longitudinal thin section, $\times 2$, USNM 309848.

4. Transverse thin section, $\times 2$, USNM 309847.

5,6. *Turbinatocaninia?* sp. (p.30).

USGS locs. 17907-PC and 6960-PC, Sections WY-3 and WY-5, Amsden Formation, Wyoming, Zone VB.

5. Transverse thin section, $\times 2$, USNM 165142a.

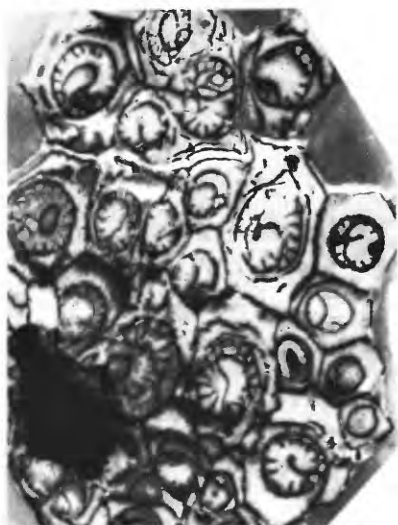
6. Longitudinal thin section, $\times 2$, USNM 165159a.

7,8. *Vesiculophyllum incrassatum* (Easton and Gutschick) (p.31).

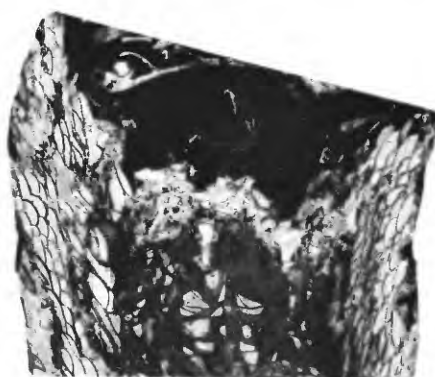
Section A-18, Redwall Limestone, Arizona, Zone II.

7. Longitudinal thin section, $\times 2$, MNA G2.4143.

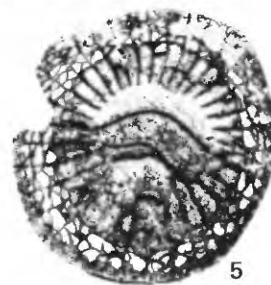
8. Transverse thin section, $\times 2$, USNM 142231.



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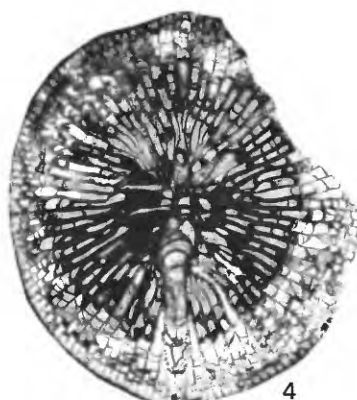


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"THYSANOPHYLLUM," TURBINATOCANINIA?, VESICULOPHYLLUM, ZAPHRIPHYLLUM