OKLAHOMA GEOLOGY NOTES

VOLUME 26 • NUMBER 8

AUGUST 1966

Cover Picture

Electron Microscopy of Clay Particles

The application of electron microscopy to clay mineralogy is demonstrated by this month's cover picture. In this electron micrograph (magnification, x27,500) the grain morphology and stacking arrangement of an individual clay particle may be observed.

The clay, an alteration product of a diabase dike which intruded the Lugert Granite, is well exposed in a deep railroad cut at the south end of Lake Altus in Kiowa County, Oklahoma. X-ray diffraction studies of size-fractionated samples of the clay indicate a partially expandable, randomly mixed-layer structure. As observed at magnifications of greater than x10,000, the clay is seen to occur in stacks with thin laths extending outward from the core of the particle at regular crystallographic angles. The rotation of successive layers in the basal plane results in more than one angular direction being observed within an individual stack. This stacking arrangement is commonly present in most micaceous structures. X-ray diffraction studies indicate that the clay partially expands perpendicular to the platy layers when exposed to organic solvents. As seen in the electron micrograph, this expansion is probably confined to the outer laths extending from the core of the stack.

The newly acquired Phillips-Norelco N-200 electron microscope at The University of Oklahoma is currently being utilized for studies in paleontology, mineralogy, and numerous research areas in biology, botany, and zoology. Dr. John J. Skvarla, the faculty member responsible for its operation, has degrees in both geology and botany.

—Clayton R. Nichols

Rim Albite in Coarse-Grained Quanah Granite, Wichita Mountains, Oklahoma

C. A. Merritt

Albite occurring as partial rims on feldspar grains in granites has been reported by several observers and is a common feature in granites of certain areas. Rim albite is uncommon or absent in most of the granites of the Wichita Mountains but is common in the coarse-crystalline type of Quanah Granite which is exposed in the southwestern part of the Wichita Mountains Wildlife Refuge. This occurrence has not been reported in the literature, and it is felt this feature should be on record.

The exposures in the southern part of Wichita Mountains Wildlife Refuge, southwestern Oklahoma, were mapped as Quanah Granite by Taylor (1915) and by Hoffman (1930). G. W. Chase remapped these rocks in more detail (manuscript map, Okla. Geol. Survey) and subdivided the Quanah Granite into four types, three occurring as plutons and the fourth as dikes. One of the Quanah pluton granites is coarsely crystalline and commonly has rim albite. The description and discussion of rim albite in this article are restricted to its occurrence in this granite.

The coarse-crystalline Quanah Granite is exposed as an eroded pluton in Charons Garden Mountain and Twin Rocks Mountain, Comanche County. The outcrop area is approximately 3 square miles and includes all of sections 22, 23, T. 3 N., R. 15 W., and extends into the adjacent sections. Isolated small outcrops are present in sections 19, 20, 21, 29, T. 3 N., R. 15 W. The granite is a member of the Wichita Granite Group (Ham, Denison, and Merritt, 1964, p. 60) and probably is Middle Cambrian in age. It is interpreted as a magmatic granite which intruded Mt. Scott Granite at shallow depths, probably 1 or 2 miles below the surface.

The rock has a light-pink color on fresh surfaces and a buff color where weathered. It is more coarsely crystalline than any of the other granites exposed in the eastern part of the Wichita Mountains. Many of the feldspar crystals are more than 10 mm long, although the average is considerably less. Locally it is medium grained, especially near the intrusive contact with the Mt. Scott Granite in SE¼ SW¼ sec. 13, T. 3 N., R. 15 W.

The rock is an alkaline leucogranite with an hypidiomorphic granular texture. An average of three thin sections gave the following mode: microperthite 64.3%, quartz 31.8%, riebeckite 2.2%, aegerine 0.4%, titaniferous magnetite 0.8%, hornblende 0.3%, zircon 0.2%, traces of fluorite and apatite.

Table I gives the chemical analysis and norms of a sample collected by Gerald W. Chase from SE¼ NW¼ SE¼ sec. 21, T. 3 N., R. 15 W., Comanche County. The sodic character of the rock is shown by the high Na_2O content (4.44%) which is greater than the K_2O content (4.31%) and by the presence of acmite in the norms. The very low

TABLE I.—CHEMICAL ANALYSIS AND NORMS OF QUANAH GRANITE

(Specimen 464, Oklahoma Geological Survey)

CHEMICAL ANALYSIS[1]		NORMS	
SiO_2	76.10	Quartz	33.51
Al_2O_3	11.66	Orthoclase	25.47
TiO_2	0.12	Albite	35.98
Fe_2O_3	1.74	Anorthite	0.00
FeO	1.15	Acmite	1.40
MnO	0.03	Diopside	0.79
MgO	0.01	Hypersthene	0.54
CaO	0.18	Magnetite	1.82
Na_2O	4.44	Ilmenite	0.23
K_2O	4.31		
Rb_2O	0.02		
BaO	0.00		
P_2O_5	0.00		
H_2O+	0.14		
H_2O-	0.01		
Total	99.91		

[1] Analysis by Rock Analysis Laboratory, University of Minnesota. Analyst: Doris Thaemlitz, 1954.

CaO content (0.18%) and the absence of anorthite in the norms are worthy of note.

Microperthite is mainly of the string type, but some of the patch type is also present. Except for the small amount of rim albite, the plagioclase is restricted to perthite. Normally the intergrowth is composed of albite and orthoclase, but microcline-microperthite was detected in a few thin sections.

Rim albite on microperthite is common. The rims are narrow (rarely exceeding 0.02 mm in width) and normally are present only on one or two sides of the host feldspar (figs. 1, 2).

Two theories to explain rim albite have been proposed. These are: (1) replacement of potassium feldspar by albitic solutions and (2) unmixing of albite from potassium feldspar on cooling. In recent years the latter theory has been favored by several writers (Tuttle, 1952; Gates, 1953; Ramberg, 1962; Phillips, 1964).

The writer believes rim albite in coarse-grained Quanah Granite is best explained as albite exsolved from potassium feldspar on cooling. Some features of this granite which are consistent with this theory are discussed below.

Microperthite is mainly of the string type, and Gates (1953, p. 58) believed this fact indicates a local origin of the sodic material. A local source would be consistent with exsolution but not with deuteric replacement. The association of rim albite with microperthite suggests a similar origin for the albite of the intergrowth and rim albite. The

Figure 1. Photomicrograph showing a rim of albite (white) on microperthite; specimen 319 from C SE¼ SW¼ sec. 13, T. 3 N., R. 15 W. Crossed nicols, x25.

Figure 2. Photomicrograph showing a rim of albite (white) on microcline-microperthite; specimen 408, from NE¼ SW¼ SW¼ sec. 25, T. 3 N, R. 15 W. Crossed nicols, x25.

exsolution process, carried beyond the intergrowth stage, may have formed the rim albite.

Coarse-grained Quanah Granite has a low lime content (0.18%), which, according to Tuttle (1952, p. 117), favors unmixing. Lime permits two feldspars to coexist at high temperatures.

The large feldspar crystals of this granite indicate good crystallization conditions, even though the pluton was emplaced at shallow depth, probably 1 or 2 miles below the surface. The coarse texture and the shallow emplacement suggest that the magma had an appreciable volatile content and cooled to a low temperature before it was completely crystallized. Such an environment would favor extensive exsolution of albite, possibly beyond the intergrowth stage to the rim-albite stage.

References Cited

Gates, R. M., 1953, Petrogenic significance of perthite, in Emmons, R. C., ed., Selected petrogenic relationships of plagioclase: Geol. Soc. America, Mem. 52, p. 55-69.

Ham, W. E., Denison, R. E., and Merritt, C. A., 1964, Basement rocks and structural evolution of southern Oklahoma: Okla Geol. Survey, Bull. 95, 302 p.

Hoffman, M. G., 1930, Geology and petrology of the Wichita Mountains: Okla. Geol. Survey, Bull. 52, 83 p.

Phillips, E. R., 1964, Myrmekite and albite in some granites of the New England batholith, New South Wales: Geol. Soc. Australia, Jour., vol. 11, pt. 1, p. 49-60.

Ramberg, Hans, 1962, Intergranular precipitation of albite formed by unmixing of alkali feldspar: Stuttgart, Neues Jahrbuch für Mineralogie, Abhandlungen, vol. 98, p. 14-34.

Taylor, C. H., 1915, Granites of Oklahoma: Okla. Geol. Survey, Bull. 20, 108 p.

Tuttle, O. F., 1952, Origin of the contrasting mineralogy of extrusive and plutonic salic rocks: Jour. Geology, vol. 60, p. 107-124.

Louise Jordan Honored

Dr. Louise Jordan, petroleum geologist of the Oklahoma Geological Survey was elected to honorary membership in the Oklahoma City Geological Society in July. She is the fourteenth recipient of this honor since its inception in 1952. The Society's constitution provides for election to honorary membership:

> . . . by unanimous vote of the Executive Committee from past and present Active Members who have made outstanding contributions first to the Society, second to the Science of Geology and third to the Geological Profession.

Election is symbolized by an award of a bronze plaque, bearing the seal of the Society and a commendation of the recipient. The plaque was presented to Dr. Jordan at her home on Tuesday, July 12, 1966. Officers and members who participated in the presentation were: John W. Ramsey, Jr. (pres.), Charles E. Branham (past pres.), Phil C. Withrow (editor), Cliff Branan, Roy P. Carmack, and Jerry B. Newby.

Dr. Jordan became a member of the Society in 1955, the year of her appointment to the Survey staff, and since that time has actively participated in Society affairs. She has served on the editorial board of the *Shale Shaker* for the past ten years. In addition, she has been active in several national societies, principally the American Association of Petroleum Geologists, the Society of Economic Paleontologists and Mineralogists, and the American Institute of Professional Geologists; she is a charter member of the Institute.

Dr. Jordan's work with the Survey has resulted in more than seventy publications upon a wide variety of geologic subjects. Notable are the compilations of the geologic maps of two key subsurface horizons in Oklahoma, the pre-Pennsylvanian and the pre-Woodford (published as Oklahoma Geological Survey maps GM-5 and GM-9), and a study (with David L. Vosburg) of the salt deposits of western Oklahoma (Bulletin 102). Most recently, she supervised the compilation of the pipeline maps of Oklahoma (maps GM-10, GM-11, GM-12, GM-13), which were published in June 1966. Although currently confined to her home because of illness, she continues to work on her present projects, the most important of which is a study of the basement rocks of the State.

Among Dr. Jordan's professional objectives has been the widespread dissemination of basic geologic information in easily accessible form, and much of her work has been directed toward this end. It is principally because of her success in this endeavor that she is so widely recognized and respected by her profession. —A. N.

New Theses Added to O. U. Geology Library

The following doctoral dissertations were added to The University of Oklahoma Geology Library during July 1966:

Structure and petrology of the eastern margin of the Wet Mountains, Colorado, by John M. Logan.

Lithostratigraphy and carbonate petrology of the Viola group (Ordovician), Arbuckle Mountains, south-central Oklahoma, by Gerald Clement Glaser.

Infeasibility of Terrestrial-type Volcanism as a Generator of Lunar Landforms

P. Jan Cannon

Lunar landforms are frequently attributed to volcanic origin solely because of their physiographic similarity to terrestrial volcanic landforms. On the Earth physiographic similarity between landforms of different origin is not unusual (e. g., kettles and solution sinks). Therefore, a geomorphological description is just as dependent upon origin as it is upon physiography. When making such descriptions of lunar forms, the plausibility of suggested origins should be considered. This precaution has apparently been inadequately observed by the proponents of volcanic mechanisms as originators of lunar landforms.

Many features and effects associated with terrestrial volcanoes offer clues to the nature of volcanic mechanisms. The active areas of terrestrial volcanism are characterized by three distinct earthquake focus areas. Along the periphery of an active volcanic area lies a deep focus zone, in which the shocks occur at depths of at least 300 km and no more than 700 km. A shock zone of intermediate depth lies directly beneath the active surface area. The shock foci in this zone extend downward from 60 km to a depth of 300 km. The third zone, with shallow shocks less than 60 kilometers in depth, coincides with and generally extends beyond the active area.

In the deep focus zone the main type of movement has been determined to be due to strike-slip or transcurrent types of faulting (Hodgson, 1957; Ritsema, 1957). In some instances the main strike-slip component of movement appears to be associated with a normal component (Wilson, 1954), indicating the possibility of oblique-slip faulting. The displacement seems to be along a steeply dipping fault plane, which appears to dip downward from the intermediate zone toward the far side of the deep zone. Along arc systems, in which this zone is well developed, this is the most extensive zone; yet in some other areas it is nonexistent.

The intermediate zone is considered to be a zone of readjustment in which strike-slip movement seems to be most prevalent (Ritsema, 1957). However, strike-slip movement does not overshadow the other types of movement which also take place in this highly active zone. Normal, reverse, and oblique-slip fault movements, coupled with expansion due to magmatic shouldering and intrusion, are all present to large degrees.

The readjustment by strike-slip movement is believed to be a consequence of movement in the deep zone. The other types of movement have magmatic movement postulated as their initiating mechanism. Because the sites of volcanoes coincide with this intermediate zone, it may be assumed that much of the movement or stress in this zone is due to movement of magma. If the vertical migration of magma is taken as a premise, a logical inference would be that in this zone is the area in which magma originates.

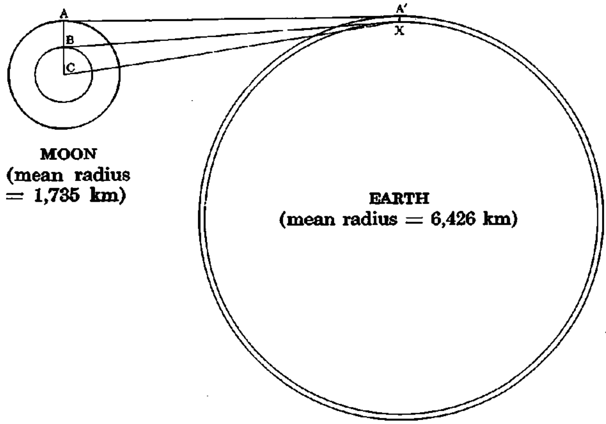


Figure 1. Dimensions of the Earth and moon, drawn to scale (1:200,000,000).

Distances		Lithostatic Pressures
A′-X = 150 km	**X**	**Approximately 50 kb**
A-B = 6 × 150 km = 900 km	**B**	**Approximately 50 kb, if moon is a layered body like the Earth**
A-C = 1,735 km	**C**	**Assumed to be approximately 50 kb, if the moon is a homogeneous sphere**

The shallow shock zone, immediately above the intermediate shock zone, is associated with the explosive eruptions of volcanoes. Shocks produced in this zone by the movement of magma through conduits are pulsatory or tremulant.

Beyond the periphery of the active area, the mechanism producing shocks in the shallow focus zone is movement along low-angle reverse faults.

Hodgson (1957) demonstrated that two adjacent zones of strike-slip or transcurrent faulting can produce two resultant zones. One is a shallow zone of low-angle reverse faulting, and the other a deep zone of normal, or gravity, faulting. As strike-slip faulting is the rule for shocks in active volcanic areas (Hodgson and Milne, 1951; Honda, 1957), perhaps Hodgson's model (Hodgson, 1957, p. 629) is the best based representation of the earthquake mechanisms associated with active volcanism.

If volcanism on the moon is assumed to be similar to terrestrial volcanism, then similar associated mechanisms, features, and effects should be assumed to exist on the moon. However, can similar associative phenomena exist on the moon?

Perhaps this question can be answered by a physical comparison of the two bodies (fig. 1). The mass of the moon is 7.3×10^{25} gm, or about 1/81 the mass of Earth. This mass, coupled with the moon's radius of 1,735 km compared to the Earth's radius of 6,426 km, gives a meaningful picture as to the relation of the sizes of the two planets. Although the earth-moon system is in fact a double-planet system, the moon is conspicuously the minor planet.

The mean density of the moon is 3.34 gm cm^{-3} and the mean density of the Earth is about 5.5 gm cm^{-3}. Now if it is logical to assume a slight density increase from the moon's surface to its center (Groves, 1962; Urey, 1962), then the density at the center of the moon is probably a little greater than 3.34 gm cm^{-3}.

It has been calculated (Groves, 1962; Urey, 1962) that the lithostatic pressure at the moon's center is approximately 50 kilobars. A corresponding lithostatic pressure of 50 kilobars is reached in the Earth at approximately 150 km beneath the surface. The density at this depth is about 3.2 gm cm^{-3}.

If the earthquake focus zones associated with active terrestrial volcanism are scaled proportionately into the moon so that nearly similar conditions are maintained, it is found that the deep focus zone is absent and the intermediate zone is incomplete.

Regardless of whether terrestrial volcanism results from fracturing and consequent pressure reduction, convection-cell processes, or energy transfer from the concentration of shear stresses, the moon is not large enough to support the observed associative phenomena of terrestrial volcanism. If the associative phenomena of terrestrial volcanism are directly connected with the mechanisms of volcanism, then the mechanisms must be absent in the moon and the lunar landforms could not have been generated by terrestrial-type volcanism.

References Cited

Groves, G. W., 1962, Dynamics of the earth-moon system, in Kopal, Zdeněk, ed., Physics and astronomy of the moon: New York, Academic Press, p. 61-96.

Hodgson, J. H., 1957, Nature of faulting in large earthquakes: Geol. Soc. America, Bull., vol. 68, p. 611-643.

Hodgson, J. H., and **Milne, W. G.**, 1951, Direction of faulting in certain earthquakes of the North Pacific: Seismol. Soc. America, Bull., vol. 41, p. 221-242.

Honda, H., 1957, The mechanism of earthquakes: Tôhoku Univ., Science Repts., Geophysics, vol. 9, supp., 46 p.

Ritsema, A. R., 1957, Pacific and Mediterranean earthquake mechanisms: Amer. Geophys. Union, Trans., vol. 38, p. 349-353.

Urey, H. C., 1962, Origin and history of the moon, in Kopal, Zdeněk, ed., Physics and astronomy of the moon: New York, Academic Press, p. 491-521.

Wilson, J. T., 1954, The development and structure of the crust, in Kuiper, G. P., ed., The Earth as a planet, vol. II of The solar system: Chicago, Univ. Chicago Press, p. 138-214.

Early Ordovician Ectoproct from Oklahoma*

June Phillips Ross†

INTRODUCTION

In three different parts of the world there are now records of Early Ordovician ectoprocts. Bassler's (1911) discovery of the ctenostome *Marcusodictyon* Bassler (1952) from the A_2 horizon of Estonia was a singular find of a number of specimens of an encrusting tubular ectoproct. More recently, Astrova (1965) described three species of a ceramoporoid cyclostome, *Profistulipora* Astrova (1965) (family Fistuliporidae), from the Lower Ordovician of Novaya Zemlya, U. S. S. R.; the precise stratigraphic position is not given but the species apparently occur in units that are correlated with the lower horizons of the Estonian succession, somewhere between the A_3 and B_{III} horizons.

This paper describes another Early Ordovician ectoproct found by Dr. William E. Ham, Oklahoma Geological Survey, and Dr. Donald F. Toomey, Pan American Petroleum Corporation, while collecting in the Wichita Mountains of southwestern Oklahoma in 1963. The specimen was first recognized as a possible ectoproct by Toomey in the course of his examination of slabbed rock samples for sponges.

This Early Ordovician ectoproct, a ceramoporoid cyclostome, *Ceramopora? unapensis*, new species (family Ceramoporidae), occurs in the Kindblade Formation, Arbuckle Group, which is considered early late Canadian in age. Ross (1964, p. 931) made reference to this occurrence. Toomey (1966, personal communication) indicated that this ectoproct occurs "in a mound build-up association with abundant lithistid sponges (*Archaeoscyphia annulata* Cullison), abundant quasi-sponges (*Calathium* sp.), and relatively common orthid brachiopods (*Finkelnburgia* spp.); in addition the mound has abundant

* The bryozoan described by Dr. Ross in this paper is significant because it is: (a) the first recorded occurrence from the Arbuckle Group, (b) the oldest known from Oklahoma, and (c) the first Early Ordovician ectoproct found in North America. Middle Ordovician Bryozoa from the Simpson Group are well known from excellent outcrops in the Arbuckle Mountains, but the new occurrence in the Early Ordovician Kindblade Limestone extends their stratigraphic range in southern Oklahoma downward about 2,500 feet. Fossiliferous limestones in the intervening sequence give promise of even more discoveries.

—W. E. Ham

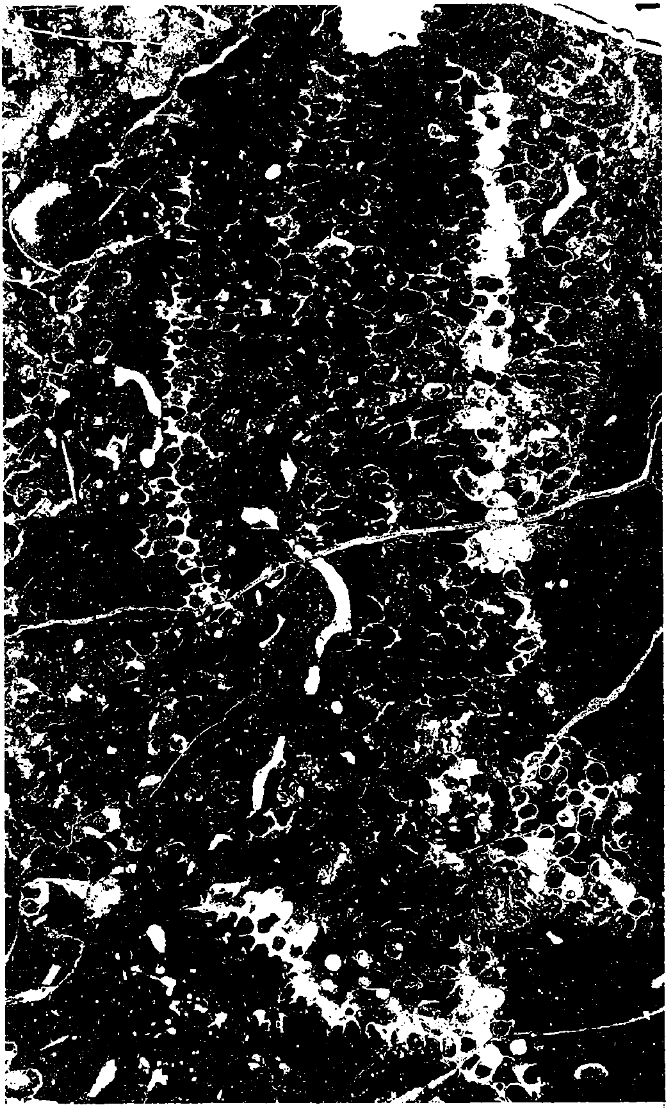
† Western Washington State College, Bellingham.

Explanation of Plate I

Ceramopora? unapensis, new species, x4, holotype OU 5796

Figure 1. Oblique tangential section of colony showing zooecia partly isolated and partly contiguous. Slide A.

Plate I



blue-green algae (*Renalcis* and *Girvanella*)." The ectoproct described here is so rare that none was observed in the field, and the present specimen, observed in a series of serial sections, was the only one found in the thin sections made of the moundrock.

Colonies from both Novaya Zemlya and the Wichita Mountains have been sectioned, and all these ceramoporoid cyclostomes show recrystallization of the skeletal material, a consistent feature of many, but not all, ceramoporoid cyclostomes. *Profistulipora* Astrova (1965, p. 144) is characterized by massive, commonly lamellar colonies of tubular zooecia with sparse diaphragms, irregularly rounded zooecial openings with weakly developed lunaria, wavy zooecial walls with small pores, and numerous cystopores in the peripheral part of the colony. This genus differs from the Oklahoma species *Ceramopora? unapensis* in having sparse diaphragms in the zooecial tubes, numerous cystopores penetrating the zooecial walls, and poorly developed lunaria. Well-defined lunaria and large zooecial tubes are distinctive features of the Oklahoma species.

Acknowledgments.—I am most grateful to Dr. William E. Ham, Oklahoma Geological Survey, and Dr. Donald F. Toomey, Pan American Petroleum Corporation, for making this material available.

SYSTEMATICS

Phylum Ectoprocta

Order Cyclostomata

Remarks.—Astrova (1964) created a new order, Cystoporata, in the class Gymnolaemata, to group Paleozoic Bryozoa of the families Ceramoporidae and Fistuliporidae of the order Cyclostomata with the families Dianulitidae and Constellariidae of the order Trepostomata. This new order was characterized by having: (1) a distinctive form of budding which takes place predominantly at the base of colonies; (2) zooecial walls with a homogeneous granular-fibrous structure, with large or small pores; (3) irregularly polygonal zooecial openings, with lunaria in many genera; (4) cystopores at the base of the colony and between zooecia.

Several of the genera, particularly the Trepostomata, which Astrova grouped into this new order, do not appear to be closely related to the Ceramoporidae or Fistuliporidae; for example, some of the trepostome genera lack a homogeneous granular-fibrous wall structure. Therefore it seems advisable, before regrouping these genera, to obtain

---

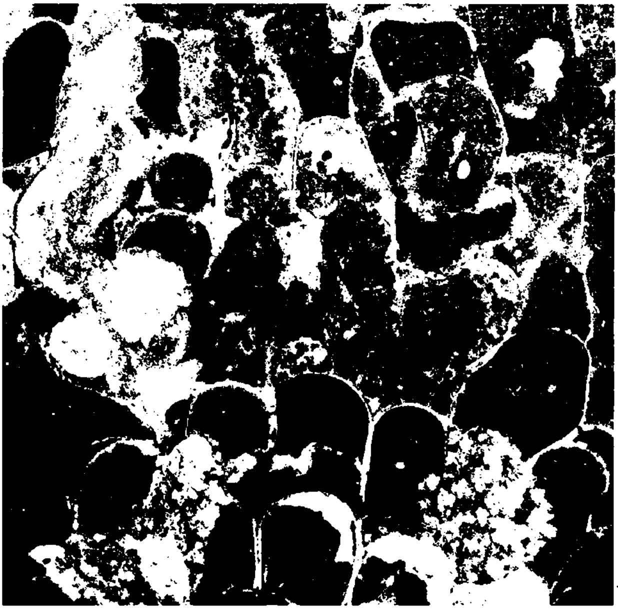
Explanation of Plate II

Ceramopora? unapensis, new species, holotype OU 5796

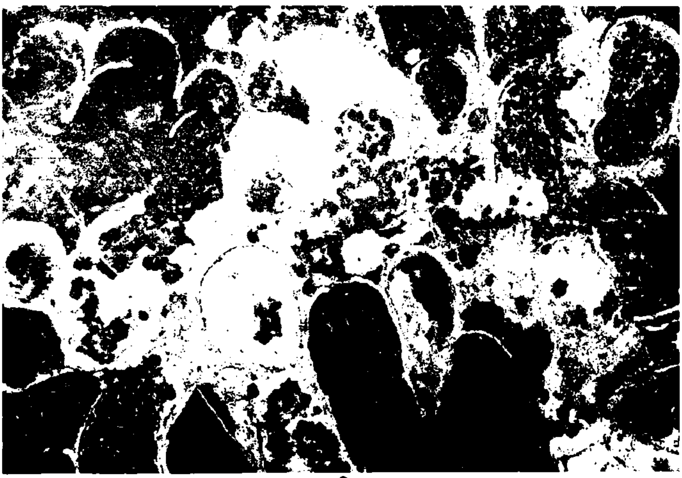
Figure 1. Oblique tangential section, x2. Subrectangular zooecial sections of reclining zooecial tubes are contiguous and interstitial material is lacking. Slide C.

Figure 2. Shallower tangential section, x20, showing some zooecial tubes indented by lunaria. Slide D.

Plate II



1



2

more detailed information about their type species and distribution. Consequently, in the present study, the order Cyclostomata is retained as a broad grouping containing the Ceramoporidae and Fistuliporidae.

Genus *Ceramopora* Hall

Ceramopora Hall, 1852, p. 168.
Ceramopora Hall, Ulrich, 1890, p. 380.

Type species.—*Ceramopora imbricata* Hall (1852), Lockport Formation, Silurian, New York State.

Diagnosis.—Free or attached discoidal colonies have large oblique zooecial tubes, diameter 0.5 to 0.7 mm, arranged in a radial manner from a depressed center. Short, irregular mesozooecia are numerous at the center of the colony but decrease in number toward the margins. Sparse perforations are present in the zooecial walls.

Ceramopora? unapensis, new species
Plates I, II, III

Material.—One colony from Wichita Mountains. Location: SW¼ SW¼ sec. 32, T. 6 N., R. 15 W.; the Roosevelt Materials Company quarry, Unap Mountain, Wichita Mountains, Kiowa County, southwestern Oklahoma. Stratigraphic occurrence: Lower Ordovician (early late Canadian), Arbuckle Group, Kindblade Formation; the ectoproct material comes from a carbonate build-up approximately 450 feet above the base of the Kindblade Formation as exposed in the Unap Mountain section. Holotype OU 5796 (slides A, B, C, D) is in the paleontological collections of The University of Oklahoma.

Description.—Broad laminate colony at least 30 mm high and 45 mm long. Zooecial tubes, 0.6 to 0.85 mm in diameter, lack diaphragms and are contiguous, being in contact at several points. Zooecial openings have well-developed lunaria, occupying in some instances more than half of the circumference of the zooecial opening; lunaria in places show marked thickening of the zooecial walls to 0.15 to 0.20 mm. In thin section the zooecial openings do not show any regular arrangement; maculae are absent in material sectioned; however, such structures could be obliterated by recrystallization, which is particularly marked at the peripheral region of the colony. Length of zooecial open-

---

Explanation of Plate III

Ceramopora? unapensis, new species, holotype OU 5796

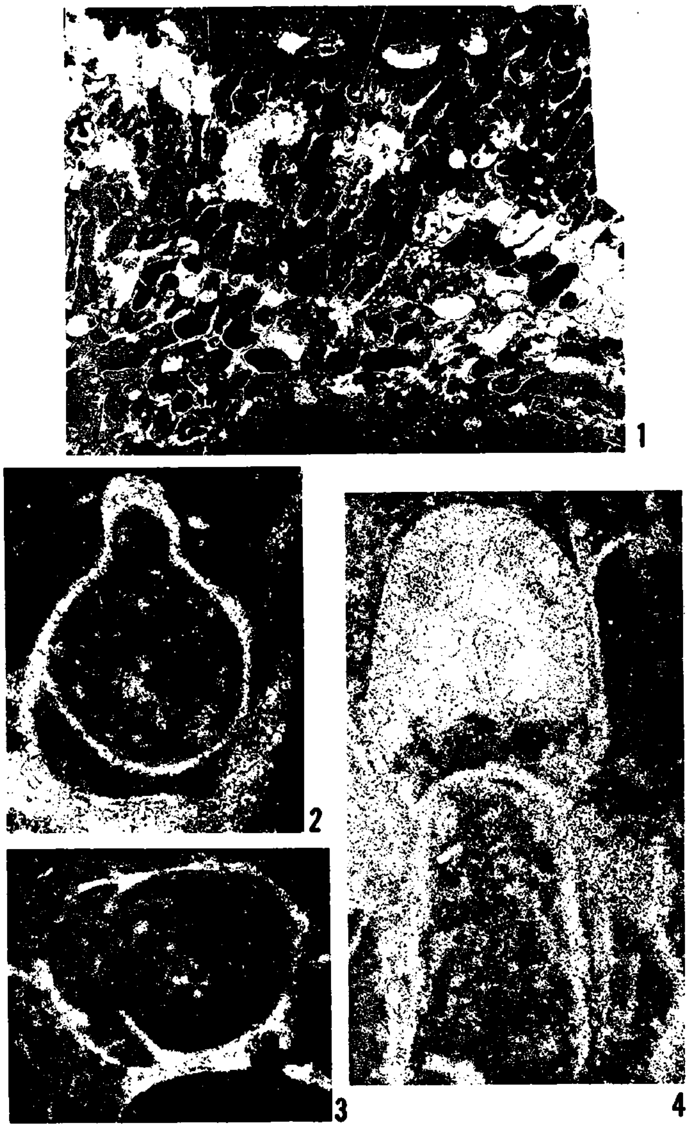
Figure 1. Oblique section, x5, showing contiguous parallel zooecial tubes. Slide B.

Figure 2. Tangential section, x50, showing well-defined lunarium at zooecial opening. Slide A.

Figure 3. Oblique tangential section, x50, showing perforate walls and lunaria projecting into zooecial tube. Slide A.

Figure 4. Oblique tangential section, x50, showing subrectangular outlines of zooecial tubes and recrystallized wall structure. Slide B.

Plate III



ing, 0.85 to 0.90 mm; width of zooecial opening, 0.55 to 0.70 mm. No mesozooecia or interstitial structures are present between zooecia.

Remarks.—This colony is assigned to *Ceramopora* with question because Ulrich's description (1890, p. 463) of the type species, *C. imbricata*, refers to irregular mesozooecia and his illustrations (pl. 39, figs. 1, 1b) show intrazooecial openings in the tangential sections. Such structures are absent in the Oklahoma species. *Ceramopora? unapensis*, like *C. imbricata* Hall, has large zooecial tubes and well-defined lunaria. *Ceramopora? unapensis* does not have close similarities with such species as *C. intercellata* Bassler from F_1 horizon of the Estonian succession and *C. vesiculosa* Fritz from the "Rockland beds," Ontario.

References Cited

Astrova, G. G., 1964, O novom otryade paleozoiskikh mshanok: Akademiya Nauk SSSR, Paleontologischeskii Zhurnal, no. 2 (1964), p. 22-31.

__________1965, Morfologiya, istoriya razvitiya i sistema ordovikskikh i siluriiskikh mshanok: Akademiya Nauk SSSR, Paleontologicheskii Institut, Trudy, vol. 106, 309 p.

Bassler, R. S., 1911, The early Paleozoic Bryozoa of the Baltic Provinces: U. S. Natl. Museum, Bull., vol. 77, 382 p.

__________1952, Taxonomic notes on genera of fossil and Recent Bryozoa: Washington Acad. Sciences, Jour., vol. 42, p. 381-385.

Hall, James, 1852, Descriptions of the organic remains of the lower middle division of the New York system: New York Nat. History Survey, Paleontology of New York, vol. 2, 362 p., 84 pls.

Ross, J. P., 1964, Morphology and phylogeny of early Ectoprocta (Bryozoa): Geol. Soc. America, Bull., vol. 75, p. 927-948.

Ulrich, E. O., 1890, Palaeontology of Illinois, Pt. II of Geology and palaeontology: Ill., Geol. Survey, vol. 8, p. 283-688.

ERRATUM

Oklahoma Geology Notes, April 1966, Volume 26, Number 4
Page 115: Figures 1a and 2a are transposed.

OKLAHOMA GEOLOGY NOTES

Volume 26 August 1966 Number 8

In This Issue