

The Rugose Corals

Rugose corals get their name because the exterior of many of their forms has a wrinkly appearance. They are often called “horn corals” because their form may resemble the horn of a cow or goat. In fact, the largest horn coral (*Siphonophrentis elongata*, figure 1) was referred to as a “petrified buffalo horn” by settlers due to its shape.

Horn corals show a wide variation in form, although external form is not a distinguishing feature for identification. Most rugose corals have septa radiating from the center (like bicycle spokes) when observed in cross-section (figure 2).



Figure 2. Coral Septa

Cystiphyllodes is characterized by dissepimentaria, bubble-like structures forming layers. Some have a both as internal structures (figure 3).



Figure 3. *Cystiphyllodes*

Looking closely at the overall shape and internal structure, one can appreciate the enormous variety of the 212 species that have been recorded at the Falls of the Ohio.

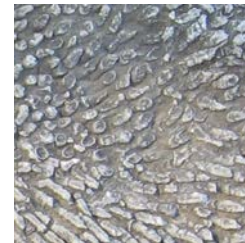


Figure 4. *Eridophyllum*

It is easy to understand why identifying new species is so difficult.

Further “complicating” factors - many rugose corals are not solitary, but colonial - and some may be either form! Individual corallites in a colonial coral may grow nearly parallel to neighbors, but occasionally

contact with them, such as *Eridophyllum* (figure 4).

If the rugose coral is massive and the individuals are in full contact with one another, it forms beautiful geometric patterns, like *Prismatophyllum prisma* (figure 5). The largest colonial rugose coral on the Indiana shore (directly below the Interpretive Center) is a *Prismatophyllum* colony 11 feet (3.3 m) across. A 30-foot (10 m) colony is reported on the Kentucky side.



Figure 5. *Prismatophyllum*

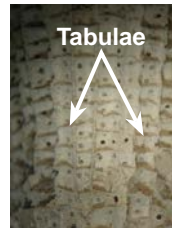


Figure 6.

Tabulate Corals

Tabulate corals are always colonial. Their name is derived from a flat shelf (tabula) that separates individuals vertically in the colony (figure 6). The individual corallites that make up the colony are typically 0.5 - 8 mm wide. Despite the small individuals, these corals can be quite large. The most common coral is a form called *Favosites* (*Emmonsia*).

Emmonsia was given its own genus name, but some specialists consider it to be a sub-genus of *Favosites*. These corals vary from a few inches (or centimeters) to 15 feet (4.5 m) across. The larger colonies probably had hundreds of thousands (or millions) of small polyps living at one time.



Figure 7. *Favosites* (*Emmonsia*), detail

The colonial form of tabulate corals reflects the environment. As in a modern reef, colonial corals can grow in mounds, “bushes,” sheets and plates.

The first two forms are dominant, typical of high energy conditions, where there is strong wave action and currents. *Favosites* (*Emmonsia*) grow in mounds (figure 7) and very thick branching forms. The largest [*F. (E.) ramosa*] form colonies over 50 feet (15 m) across with other corals filling in the space between branches as the colony was buried. *Alveolites* and *Thamnopora* grow in bushes with branches from 1/4” to one inch thick (figure 8). The latter occurs in colonies as large as 8 feet (2.4 m) across. *Platyaxum* is an uncommon coral, growing in a plate-like form.



Figure 8. *Thamnopora*

Two other corals deserve particular mention because they are unlike other tabulate corals. *Syringopora* grows in mound or bush-like forms consisting of curved, straight or gently undulating tubes (figure 9). *Aulocystis* is a dendroid (branching) coral with a tight bush-like form (figure 10).



LEFT: Figure 9. *Syringopora*



RIGHT: Figure 10. *Aulocystis*

A Devonian coral garden

There are 212 species of corals known from the fossil beds at the Falls of the Ohio. Not all occur in the coral beds; some may be found in the slightly higher (younger) rock layers. Additional studies may reveal more or fewer species. It takes experience to identify corals with accuracy. The random orientation of many of the solitary rugose corals make identification even more difficult.



Figure 11. Underside of *Alveolites* coral

Look for evidence of Devonian hurricanes. Can you find inverted colonies? Many corals radiate toward a center point, indicating they are upside-down (figure 11). Some of these colonies were more than 1,000 pounds! Others are on their side. Many colonial corals show rhythmic banding, whether these are daily seasonal or lunar cycles are unknown. Horn corals that are “J” or “L” shaped are were also jostled by storms, and bent back towards sunlight (see figure 1).

The coral beds are best exposed late summer through the fall. Visitors have the rare opportunity to walk on an ancient sea floor to get a good idea how corals were distributed if one could go back in time with snorkeling gear.

References & Suggested Reading

- *Davis, W. J., 1885, *Kentucky Fossil Corals*, Kentucky Geological Survey.
- Greb, Stephen F., et al, 1993, *Fossil Beds of the Falls of the Ohio*, Kentucky Geological Survey.
- Oliver, W. A., Jr., 1976, *Devonian Noncystimorph Colonial Rugose Corals in the New York Area*, U. S. Geological Survey, Professional Paper 869.
- *Stumm, E.C., 1964, *Silurian and Devonian corals of the Falls of the Ohio*: Geological Society of America Memoir 93.

* Out of print, check public or university library or on-line.

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Cover photo: Figure 1. *Siphonophrentis elongata*

CORALS

at Falls of the Ohio State Park

Alan Goldstein, Interpretive Naturalist



The fossil beds at the Falls of the Ohio State Park, located between Louisville, Kentucky and Clarksville, Indiana, are world-renowned. First described by European settlers paddling down the Ohio River over 250 years ago, the abundance of corals is still striking today. Are these fossil corals related those living in today's oceans? In a word, “no.” Modern (scleractinian) corals first appear in the fossil record in the early Triassic period, about 241 million years ago. The corals from the Falls of the Ohio are much older, about 390 million years old! Some varieties superficially resemble living corals, because they lived in a similar habitat - shallow, warm, tropical seas.

Two orders of coral dominated the Devonian seas: rugosa and tabulata. Both became extinct at or near the end of the Permian period, about 240 million years ago. Both orders appeared in the early Ordovician period and their diversity peaked during the Devonian.

Fossil Coral Names in Current Use

Rugose Corals

Acinophyllum mclareni Fagerstrom
Acinophyllum stokesi (Milne-Edwards & Haime)
Acrophyllum clarki Davis
Acrophyllum conigerum (Greene)
Acrophyllum ellipticum Davis
Acrophyllum oneidaense (Billings)
Aemulophyllum exiguum (Billings)
Aemulophyllum exiguum elongatum (Davis)
Amplexiphyllum cruciforme (Hall)
Amplexiphyllum tenue (Hall)
Aulacophyllum conigerum Davis
Aulacophyllum mutabile Davis
Aulacophyllum perlamellosum (Hall)
Aulacophyllum pinnatum Hall
Aulacophyllum sulcatum (d'Orbigny)
Bethanyphyllum arctifossa (Hall)
Bethanyphyllum depressum (Hall)
Bethanyphyllum nanum (Davis)
Bethanyphyllum pocillum (Davis)
Bethanyphyllum prateriforme (Hall)
Bethanyphyllum robustum (Hall)
Bethanyphyllum validum (Hall)
Bethanyphyllum vesiculatum (Hall)
Blothrophyllum romingeri Stumm
“*Blothrophyllum*” *tristulcatum* (Hall)
(Needs to be studied. Neither *Blothrophyllum* or *Tabulophyllum*)
Bordenia knappi Hall
“*Breviphrentis halli*” (Edwards & Haime)
“*Breviphrentis*” *nitida* (Hall)
“*Breviphrentis*” *ovalis* (Hall)
Breviphrentis (?) *planima* (Hall) [further study needed]
Bucanophyllum ohioense (Nicholson)
Cayugaea (?) *subcylindricum* Stumm
Cladionophyllum cicatriciferum (Davis)
Coleophyllum romingeri (Hall)
Compressiphyllum davisana (Miller)
Craterophyllum adnascens (Greene)
Craterophyllum (?) *latiradium* (Hall)
“*Craterophyllum*” *magnificum* (Billings)
Cyathocylindricum gemmatum (Hall)
Cyathocylindricum opulens Oliver
Cylindrophyllum gradatum (Greene)
Cystiphyllodes americanum (Edwards & Haime)
Cystiphyllodes crassatum (Greene)
Cystiphyllodes hispidum (Davis)
Cystiphyllodes infundibuliformis (Greene) (**figure 3**)
Cystiphyllodes limbatum (Davis)
Cystiphyllodes nanum (Hall)
Cystiphyllodes plicatum (Davis)
Cystiphyllodes pustulatum (Hall)
Cystiphyllodes quadrangulare (Hall)
Cystiphyllodes tenuiradium (Hall)
Diplochone greenei (Miller)
“*Disphyllum*” *synaptophylloides* Stumm

Edaphophyllum bifurcatum (Hall)
Enallophrentis concava (Hall)
Enallophrentis ? *curvata* (Hall)
Enallophrentis ? *cyathiformis* (Hall)
Enallophrentis duplicata (Hall)
Enallophrentis ? *foliata* (Hall)
Enallophrentis inflata (Hall)
Enallophrentis simplex (Hall)
Enallophrentis tristutura (Hall)
Eridophyllum apertum (Hall) (**figure 4**)
Eridophyllum archaici (Billings)
Eridophyllum coagulatum (Davis)
Eridophyllum seriale Edwards & Haime
Eridophyllum tumidulum (Hall)
Hadrophyllum orbigny Edwards & Haime
Hallia strigata (Greene)
Heliophyllum agassizi Greene
Heliophyllum alternatum Hall
? *Heliophyllum coalitum* (Rominger)
Heliophyllum denticulatum Hall
Heliophyllum ethelanum (Davis)
Heliophyllum gurleyi Greene
Heliophyllum halli Edwards & Haime
Heliophyllum incrassatum Hall
Heliophyllum infundibulum Hall
Heliophyllum ingens (Davis)
Heliophyllum insigne (Davis)
Heliophyllum latericrescens Hall
Heliophyllum pocillum (Davis)?
Heliophyllum tenuiseptatum Billings
Heliophyllum venatum Hall
Heliophyllum verticale Hall
Heliophyllum yandelli (Rominger)
“*Heterophrentis*” *annulata* (Hall)
Heterophrentis is not a valid genus.
“*Heterophrentis*” *colletti* (Hall)
“*Heterophrentis*” *irregularis* (Hall)
“*Heterophrentis*” *rafinesqui*
(Edwards & Haime)
“*Heterophrentis*” *subcompressa* (Hall)
Homalophyllum fusiformis (Hall)
Homalophyllum herzeri (Hall)
Homalophyllum ungulum (Rominger)
lowaphyllum knotti (Davis)
Kionelasma coarticum (Hall)
Kionelasma? *conspicuum* (Hall)
Kionelasma mammiferum (Hall)
Odontophyllum convergens (Hall)
Prismatophyllum bella (Davis)
Prismatophyllum conjunctum (Davis)
Prismatophyllum ovoideum (Davis)
Prismatophyllum prisma Lang & Smith (**figure 5**)
Prismatophyllum truncata Stewart
Scenophyllum (?) *coniferum* (Greene)
Scenophyllum conigerum (Rominger)
Schlotheimophyllum typicum (Davis)

Schlotheimophyllum versiforme (Hall)
Siphonophrentis elongata (Rafinesque & Clifford) (**figure 2**)
Siphonophrentis yandelli (Edwards & Haime)
“*Skoliophyllum*” *squamosum* (Nicholson) [Probably new genus]
Stauromatidium trigemma (Davis)
Stereolasma (?) *exile* (Davis)
Stereolasma gallicacar (Davis)
Stereolasma parvulum (Davis)
Stereolasma rectum (Hall)
Tabulophyllum? *bellicinctum* Greene
Tabulophyllum? *greeni* (Davis)
Tabulophyllum? *perplicatum* (Hall)
Tabulophyllum? *sinuosum* Hall
Tabulophyllum? *tripinnatum* (Hall)
Tabulophyllum zaphrentiforme Davis
Triplophyllum terebrata (Hall)
Zaphrentis phrygia Rafinesque & Clifford

Tabulate Corals

Alveolites asperus (Rominger)
Alveolites constans Davis
Alveolites expatiatus (Rominger)
Alveolites goldfussi Billings
Alveolites minimus Davis
Alveolites mordax Davis
Alveolites squamosus Billings
Alveolites winchellana (Miller)
Antholites speciosus Davis
Aulocystis auloporoidea (Davis)
Aulocystis fascicularis (Davis)
Aulocystis frutescens (Davis)
Aulocystis (?) *incrustans* (Davis)
Aulocystis jacksoni (Grabau)
Aulocystis nobilis (Billings)
Aulocystis (?) *procumbens* Davis
Aulocystis transitorius Stumm
Aulopora culmula Davis
Aulopora edithana Davis
Aulopora tubiporoidea (Yandell & Shumard)
Bractea arbor (Davis)
Bractea frutex (Davis)
Bractea impedita (Davis)
Chonostegites clappi Edwards & Haime
Chonostegites tabulatus (Edwards & Haime)
Cladopora acupicta Davis
Cladopora bifurca Davis
Cladopora (?) *gracilis* Davis
Cladopora gulielmi Davis
Cladopora (?) *imbricata* Rominger
Cladopora labiosa (Billings) [often confused with *Alveolites winchellana* (Miller)]
Cladopora (?) *robusta* Rominger
Favosites “*Emmonsia*” *amplissima* (Davis)
Favosites “*Emmonsia*” *arbuscula* (Hall)
Favosites “*Emmonsia*” *bacula* (Davis)

Favosites “*Emmonsia*” *convexa* (Davis)
Favosites “*Emmonsia*” *cymosa* (Davis)
Favosites “*Emmonsia*” *emmonsi* (Rominger)
Favosites “*Emmonsia*” *eximia* (Davis)
Favosites “*Emmonsia*” *epidermata* (Rominger)
Favosites “*Emmonsia*” *ocellata* (Davis)
Favosites “*Emmonsia*” *radiciformis* (Rominger)
Favosites “*Emmonsia*” *ramosa* (Rominger)
Favosites “*Emmonsia*” *tuberosa* (Rominger)
Favosites argus Hall
Favosites biloculi Hall
Favosites clausus Rominger
Favosites clelandi Davis
Favosites goldfussi d'Orbigny
Favosites hamiltoniae Hall
Favosites mundus Davis
Favosites patellatus Stumm
Favosites pirum Davis
Favosites placentus Rominger
Favosites proximatus Stumm
Favosites quercus Davis
Favosites ramulosus Davis
Favosites rotundituba Davis
Favosites turbinatus Billings
Lecfedites canadensis (Billings)
Platyaxum foliatum Davis
Platyaxum frondosum (Nicholson)
Platyaxum orthosoleniskum (Werner)
Platyaxum undosum Davis
Pleurodictyum cornu Stumm
Pleurodictyum cylindricum (Michelin)
Pleurodictyum insigne (Rominger)
Pleurodictyum maximum (Troost)
Pleurodictyum michelinoidea (Davis)
Pleurodictyum papillosa (Davis)
Pleurodictyum planum (Davis)
Pleurodictyum spiculata (Greene)
Pleurodictyum wardi Greene
Romingeria commutata Beecher
Romingeria fasciculata Davis
Romingeria umbellifera (Billings)
Romingeria uva Davis
Romingeria vannula Davis
Striatopora (?) *alba* Davis
Striatopora bellistriata Greene
Striatopora cavernosa Rominger
Syringopora hisingeri Billings
Syringopora perelegans Billings
Thamnopora distans (Nicholson)
Thamnopora limitaris (Rominger) (**figure 8**)
Thamnoptychia alternans (Rominger)
Thamnoptychia tuberculata (Stumm)
Thamnoptychia vermiculosa (Leseur)

Acknowledgement: The writer would like to thank the late Dr. William A. Oliver, Jr. for critical review of the faunal list with updated names