Crinoid and Starfish Fossils from LeGrand, Iowa

By Richard Boyt
Museum Director
Iowa State Department of History and Archives

Price Fifty Cents
B. H. Beane, LeGrand, Iowa
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The venerable doctor threw up his hands in amazement. "Good Lord, Mr. Beane! Where did you find them? They're worth more than the whole quarry!" Dr. Abram O. Thomas, professor of geology at the State University of Iowa, stared in disbelief at the freshly split slab of limestone. There, spread before him like stars on a clear and moonless night, were the fossil remains of a large group of rare and long extinct starfish.

These were not merely the arms and broken portions of starfish which, even had they been barely recognizable, would have made the slab an important and valuable find. Rather, the vast majority of these were complete or nearly complete starfish, 183 of them ornamenting the 3 foot by 5 foot slab in an unbelieveable bas-relief. It was their degree of perfection, however, rather than their large number which later prompted Dr. Charles Schuchert of Yale University to declare that they constituted the greatest find of fossil starfish ever made.

Needless to say, the finding of this incredible slab must be attributed to more than mere chance, and indeed, its discovery marked the climax of a chain of events that had been set in motion many years earlier. This chain of events might be said to have had its beginning in the year 1874 in a limestone quarry just a mile north of the little central Iowa town of LeGrand.

Quarrying was largely a hand operation in those days before the advent of the bulldozer and power-shovel. Perhaps it was one of the workmen who first noticed on the surface of a chunk of freshly blasted rock an unusual, intricate pattern of shapes that closely resembled fragile flowers complete with long stems. These "stone flowers" were actually

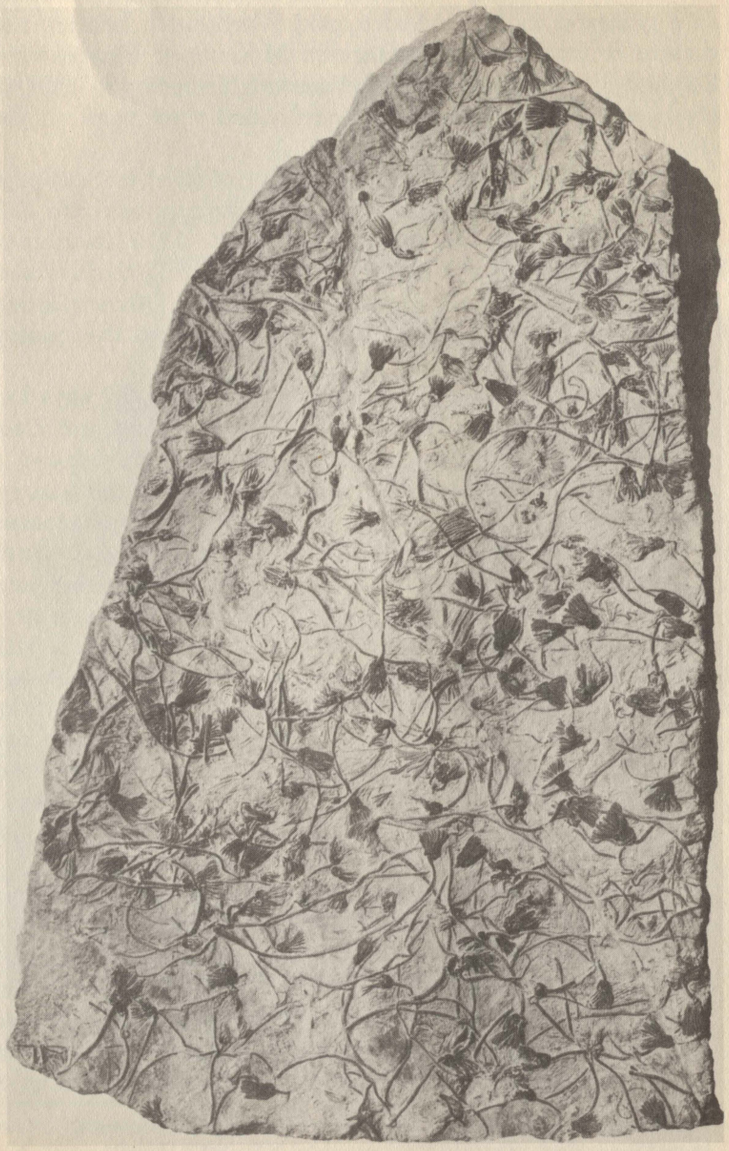
crinoids, a group of marine animals closely related to starfish and sea urchins. Perhaps the workman knew the importance of his discovery, though the chances are that he did not. In any case, the news of the unusual bouquet spread, and soon collectors gathered to see and to search for additional slabs of these relics of Iowa pre-history. True, isolated crinoids had been found occasionally in the quarry, but nothing like the "nest" of them that had now been broken into, and which revealed its extent by a thin stratum of broken stems and heads that showed on the solid cliff of unbroken rock.

For the next sixteen years that the "nest" produced additional specimens, it would be difficult to assign too much credit to George F. Kirby and H. J. Howe of nearby Marshalltown, operators and owners of the quarry. Through their understanding of the importance of the find and their cooperation with the collectors, many specimens were saved that would have otherwise gone through the rock crusher and ended up as ballast for the railroads.

During these years a number of excellent collections were made by local residents, the Hon. Delos Arnold, Dr. W. S. McBride, Dr. W. B. Waters, Lewis Hammond, John McCabe, and Corwin O'Neal. Each of these men as well as the quarry owner, George Kirby, were to have newly found species of these LeGrand crinoids named after them. The two great teams of scientific investigators, Miller and Gurley, and Wachsmuth and Springer, studied and published works describing and naming the new species of the crinoids that were being found.[1]

Iowans Charles Wachsmuth and Frank Springer, both avid collectors and students of crinoids, amassed a truly extensive collection which is now housed in the Smithsonian Institution. In 1897, they published a monumental work on the camerate

1 S. A. Miller and Wm. F. E. Gurley, "New Genera and Species of Echinodermata," *16th Ann. Rept.*, Indiana Dept. Geol. and Nat. Hist., pp. 327-373 (1889); C. Wachsmuth and F. Springer, "New Species of Crinoids and Blastoids from the Kinderhook Group of the Lower Carboniferous Rocks at LeGrand, Iowa," *Illinois Geol. Survey*, Vol. 8, pp. 155-205 (1890); S. A. Miller and Wm. F. E. Gurley, "New Genera and Species of Echinodermata," *Illinois State Mus. Bull.*, No. 5 (1894).



A 20″ x 30″ slab of crinoids found near LeGrand, Iowa, on display at the Iowa State Historical Museum Museum Photo

crinoids of the world.[2] Springer was later to exhibit his skills as a geologist in New Mexico, and Wachsmuth became the curator of crinoids at the Harvard Museum of Comparative Zoology at Cambridge, Massachusetts. Tribute was paid to these two early Iowa paleontologists and their work in the *Annals of Iowa* in 1896.[3]

A young boy here enters our narrative, a quiet lad, perhaps a bit more serious and intense than the average ten year old. Burnice Hartley Beane, born November 17, 1879, the son of a Quaker minister and farmer, became at first curious and finally fascinated by the comings and goings of these learned men of the scientific world who beat a path to the quarry next to his farm home.

"These scientists were the idols of my boyhood," says Dr. Beane. "I pestered them with endless questions and they answered me with inexhaustible patience. I soon became a fossil collector and spent most of my spare time at the quarry. After this first mother lode of crinoids was finally exhausted in 1890, the pickings were exceedingly lean. From the turn of the century until 1931, I must have turned over and examined a thousand tons of loose rock, and at the same time kept a close watch on the entire quarry face. This I did with the aid of an extension ladder which allowed me to closely scrutinize the cliff for telltale showings of cross sections of stems and heads. Only about one rock in 500 would prove to be fossiliferous, and not more than one or two per cent of these contained specimens worth saving. I made friends among the quarry workers who would notify me when they came across anything that they considered interesting."

At last one memorable day in the summer of 1931, a blast uncovered the edge of another nest of crinoids about 100 feet from the location of the initial find. This one was a lense-shaped deposit about 15 feet across, and while somewhat smaller than the first deposit, the specimens that it contained were in a state of preservation second to none. When Beane arrived at the quarry and began to find the telltale traces of

2 C. Wachsmuth and F. Springer, "Crinoidea Camerata," *Mem. Mus. Comp. Zool. Harvard College,* Vols. XX, XXI, (1897).

3 Charles R. Keyes, "An Epoch in the History of American Science," *Annals of Iowa,* Vol. II, Third Series, pp. 345-363, (1896).

A 25″ x 30″ slab containing crinoids, brachiopods and other fossils on display at the Iowa State Historical Museum Museum Photo

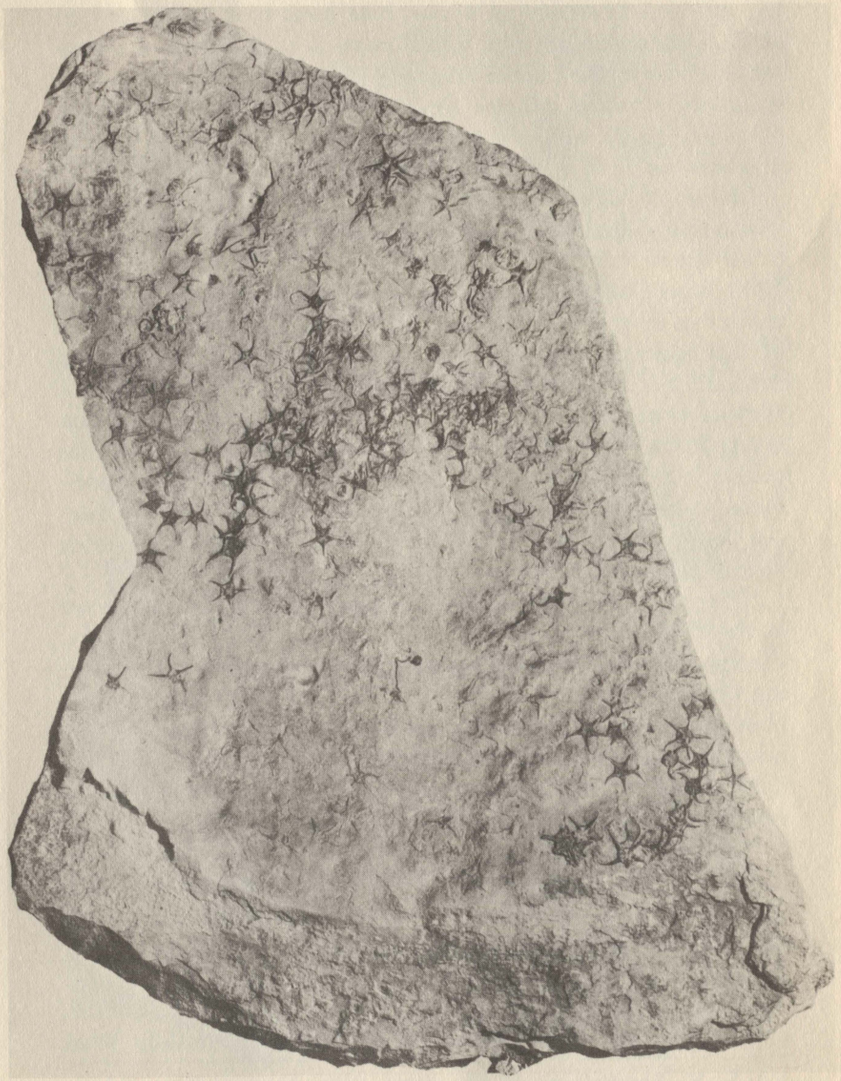
stems and heads in the broken rock that had fallen to the quarry floor, he at once suspected that a new nest had been broken into. And so began the exciting race with time to save as many specimens as possible from the crusher.

While searching the broken rock for crinoids, Beane came upon a slab that must have surely taken away his breath, for there, spread on its surface, were starfish! Starfish — rarest of all the fossil animals found at LeGrand! Yes, a few isolated individuals had been found by earlier collectors, but this great slab showed a *group* of them, and hidden tantalizingly beneath a thin covering of rock lay the promise of still more. The most valuable single chunk of fossiliferous rock ever to come from the quarry, possibly from any quarry, had at last come to light after its 250 million year entombment.

Not daring to clean the slab where it lay, Beane began preparations to have it taken to his backyard workshop. With great care the 650 pound slab was pried onto a truck, and slowly removed from the quarry. At the workshop the promise of the great rock was more than fulfilled, for the removal of the thin layer of stone revealed an amazing 183 starfish, twelve sea urchins, two trilobites, and a number of other marine fossils in a great jumble of perfection. Quickly notified of the find, it was only a short time later that Dr. Thomas first saw it and uttered the exclamation with which this story begins.

Second in importance only to the big starfish slab were the numerous smaller slabs containing crinoids, and two small pieces containing starfish, that had broken from the big slab. Several of the crinoid slabs less than three feet across contained as many as 200 excellently preserved specimens.

Again the scientists and collectors flocked to the quarry to see the crinoids and starfish, and to offer encouragement in the work of saving them. Lewis Hammond and Corwin O'Neal, local collectors and lifelong friends of Beane, were particularly helpful in encouraging him, and no doubt many a wintry evening was spent with the three of them gathered about the "Round Oak" coal stove in O'Neal's newspaper office comparing notes and speculating on the possibility of future finds.



The great starfish slab containing 183 starfish, 12 sea urchins and 2 trilobites, on display at the Iowa State Historical Museum
Museum Photo

They had not long to wait, for in 1933 another great find was made at LeGrand. Dr. Lowell R. Laudon, who was teaching at the University of Tulsa, had long been interested in the LeGrand crinoids and had become a good friend of Beane while a student at the University of Iowa. They agreed to collaborate in the collecting of specimens and in the writing of a pamphlet which was to bring up to date all of the information that had been gathered.

The account of this third and last great find at LeGrand was perhaps best given by Dr. Laudon when he wrote, "Another spectacular discovery was made during the summer of 1933, when, after an unusually strong blast, the slabs carrying crinoids were found scattered over a considerable portion of the quarry floor. Later work on the face of the quarry immediately back of the area in which the slabs were found, showed that only the outer portion of the colony had been blasted out. The length of the colony along the face of the quarry was about 20 feet. Several thousand excellent specimens were collected from the material that was taken from the floor of the quarry. Many of these slabs were far superior to any taken from the original colony.

"Plans were laid to blast the quarry down to this layer at the close of the quarrying operations in 1934. Accordingly, the top material was blasted off and men put to work removing the loose material down to the massive ledge immediately above the fossils. With the aid of bars and jack screws the massive ledge was moved enough to allow the thin soft dolomitic layers containing the crinoids to be removed. Again several thousand excellent specimens were obtained.

"Operations of the northwestern quarry during the summer of 1937 blasted out the remaining portion of the colony. With the excellent co-operation of superintendent B. K. Baumgardner, the major portion of this last portion of the colony was saved."[4]

Although the quarry remained in operation until 1958, only one further find was made, and it unfortunately went

4 L. R. Laudon and B. H. Beane, "The Crinoid Fauna of the Hampton Formation at LeGrand, Iowa, *"University of Iowa Studies in Natural History,"* Vol. XVII, No. 6, N. S. No. 345, pp. 234-235 (December 1, 1937).

A 15″ x 20″ slab containing crinoids and blastoids found in a quarry near LeGrand, Iowa, on display at the Iowa State Historical Museum

Museum Photo

through the crusher before Beane could save it. Modern quarrying techniques may increase the output of limestone, but they certainly decrease the possibilities of salvaging any fossils. Whether or not more nests exist may never be known, for as the quarrying advanced back into the side of the river valley, the cost of removal of the increasingly deep overburden of dirt became prohibitive. In the past few years many a field trip to LeGrand has ended in disappointment for the collector who had hopes of turning up a specimen that had been overlooked.

The forms of life that were found in the rock at LeGrand are quite varied. Forty species of crinoids have been indentified, and eleven of these were first described by Laudon and Beane.[5] While all of the starfish on the big slab are believed to be Iovaster grandis, a new species first described and named by Keyes and Beane, another five rayed starfish and a species possessed of twenty or more arms were also found at LeGrand. Rivaling the crinoids and starfish in their perfection are two rare species of blastoids. Sea urchins, brachiopods, bryozoans, and corals are also found, as well as an occasional gastropod, shark tooth or spine, trilobite, and cystoid. The entire outcropping at LeGrand is part of the Hampton formation of the Kinderhook group of the Mississippian system.

Finding a chunk of rock with a showing of broken crinoids on its edge may be a rare experience, but it marks only the beginning of the long job of revealing these animals in all their beauty. The soft dolomitic limestone that carries the fossils is never more than ten inches thick, but since the layer of fossils usually lies within the slab, it is necessary to split it at just the right horizon. The split is started by tapping the edge with a hammer until the first, nearly invisible hairline crack appears. When the crack is detected, small nails are driven into it carefully at intervals of about ½ inch. These are succeeded by heavier nails until, with luck, the slab parts at just the right place with all, or at least most, of the fossils attached to one side.

5 Ibid.

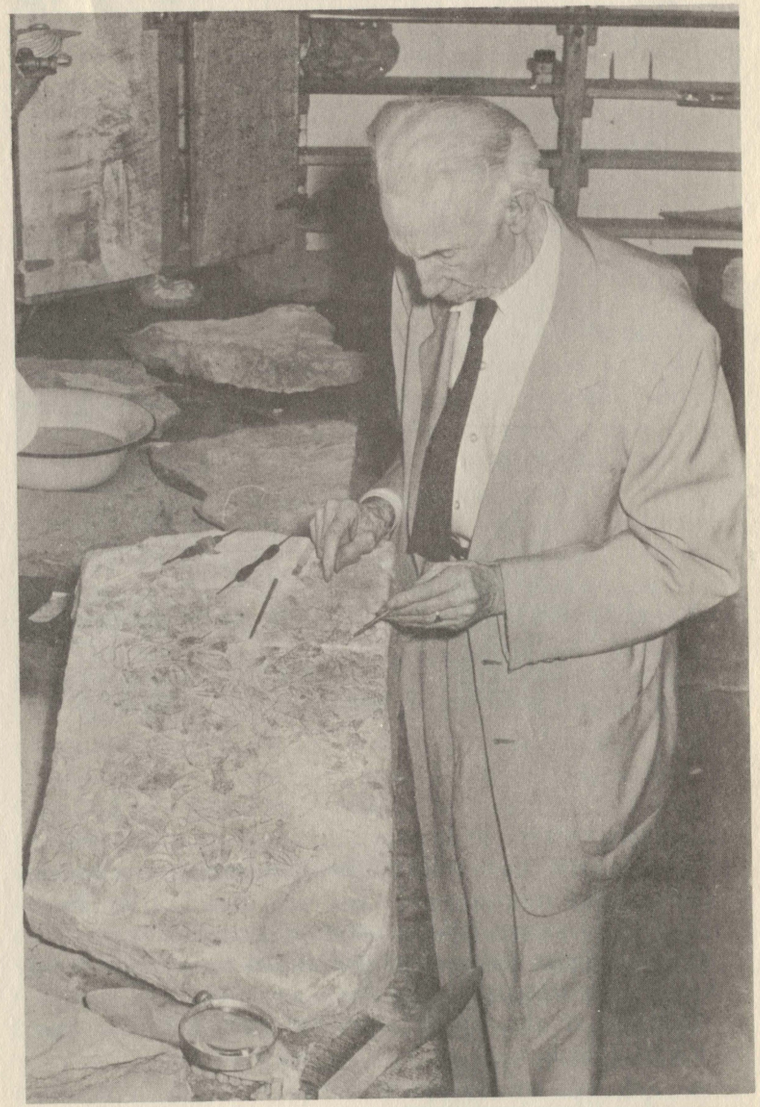
Nine species of crinoids from LeGrand—Left row, top to bottom: Eutaxocrinus fletcheri, Platycrinus symmetricus, Cactocrinus ornatissimus, Cactocrinus nodobrachiatus; Center row: Dichocrinus cinctus, Cactocrinus ornatissimus, Aorocrinus immaturus; Right row: Rhodocrinus kirbyi, Pachylocrinus spartarius, Dichocrinus inornatus Museum Photo

Now begins the long and tedious task of cleaning, for invariably a considerable amount of stone clings to the crinoids obscuring their detail. A toothbrush, a needle held firmly in a pin vise, and infinite patience coupled with the ability to guess accurately just what lies hidden beneath the stone — these are the tools that Dr. Beane used. The average slab might take several months to clean; however, he worked at the starfish slab off and on for thirty years. In recent years Beane has also taught his son, Lewis, to become a skilled fossil cleaner, and between the two of them they have prepared perhaps 100 slabs. Lately, Lewis has largely taken over this tedious handwork.

At first Beane kept every specimen that he collected. His home soon became a treasure trove of these rare relics of ancient life, and the world began to beat a path to his door to see them. Singly and in groups, students from high schools, colleges and universities from all over the state and even neighboring states made field trips to see them. Professional and amateur geologists and paleontologists from every part of the United States, and some from foreign countries, traveled to LeGrand to become acquainted with Dr. Beane and to study his famous fossils. And at this point we can rightly call him "Dr." Beane, for in 1932 he was awarded the degree of Honorary Doctor of Science by Penn College for his important work.

Publications, both local and national, honored him with articles. Museums contacted him requesting specimens of the crinoids, but Beane did not wish to part with them. Then, on a visit to the Morrill Hall Museum at the University of Nebraska, he met and became friends with Dr. Erwin H. Barbour, the director. Dr. Barbour convinced him that it was not right for him to keep all of his scientifically valuable specimens hidden away in his little town of LeGrand. Rather, they should be in museum and university collections where the public could see and appreciate them, and where the scientists could study them. There they would help people to better understand our great heritage from the past.

Because of the new insight Dr. Barbour had given him, Beane began to make his specimens available to museums



Dr. Beane demonstrating use of the tools for cleaning the rock from the crinoids D. M. Reg. & Trib. Photo

and universities. A particularly fine slab was sent to Dr. Barbour for his museum, and additional specimens went to Simpson College, Augustana College, Earlham College, Buffalo Museum of Science; State Universities of Iowa, Kansas, Nebraska, Oklahoma, Wisconsin, Minnesota, Arizona, and Alaska; and abroad in museums in London, Paris, Holland, Capetown, and Tokyo.

In 1961, the Iowa State Department of History and Archives purchased four of his most splendid slabs, including the great starfish slab. These, along with the specimens that Dr. Beane had previously given, make an impressive permanent display at the State Museum in Des Moines.

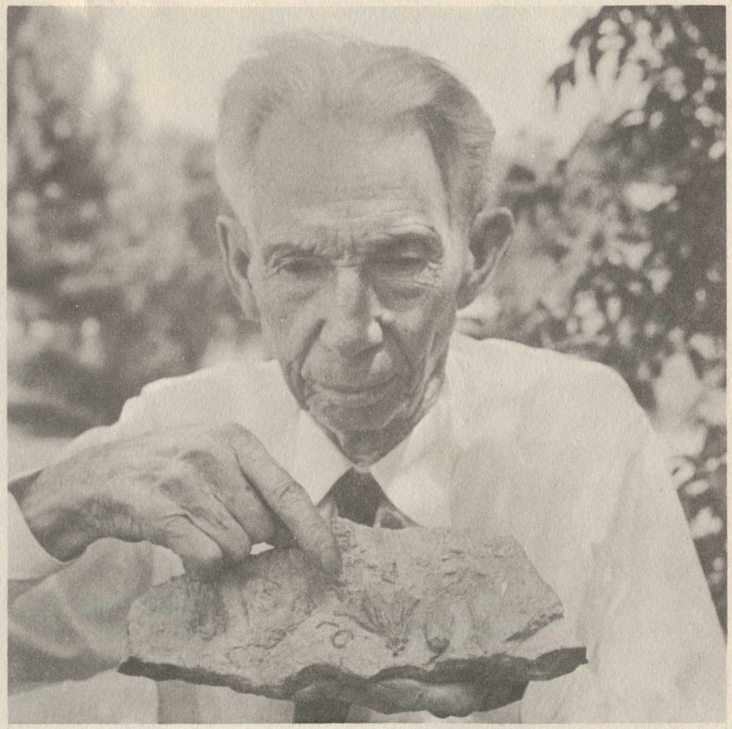
Even after these major distributions, the Beane home in LeGrand is still an amazing storehouse of fossil crinoids. Crinoids adorn every mantlepiece, every bureau top and indeed may be found in the corners of many of the bureau drawers. Crinoids are carefully wrapped and packed away in boxes and crates that fill the empty spaces beneath every bed and sofa. Crinoids in trunks and cases, in cupboards and china cabinets, on what-nots and catch-alls, in empty coffee cans and asprin boxes! Crinoids in the front yard, side yard, and back! A nearby garage contains more than two dozen splendid slabs.

How is it possible that sea animals could have lived in Iowa, an inland state that is well over 1,000 miles from any ocean? How did their fossil remains get buried deep down under the many layers of hard limestone?

These matters and many others concerning the LeGrand crinoids are considered in a recent article in the *Annals of Iowa* written by Dr. Charles S. Gwynne, professor of geology at Iowa State University and a longtime friend of Dr. Beane, entitled "B. H. Beane and the LeGrand Crinoid Hunters."[6] It takes one through the story of the crinoid deposits, their discovery, and development. Dr. Gwynne wrote:

"The part of the North American continent now called Iowa has a history, a geological history that is, that goes back many hundred-millions of years. Part-way back, some

6 Charles S. Gwynne, "B. H. Beane and the LeGrand Crinoid Hunters," *Annals of Iowa,* Third Series, Vol. XXXV, No. 7, pp. 481-485.



Dr. Beane at the age of 82 is still a keen student of the LeGrand fossils. D. M. Reg. & Trib. Photo

250,000,000 years ago, there lived in the vicinity of what is now LeGrand, Marshall County, Iowa, along with other forms of marine life, great numbers of marine invertebrates called crinoids. Note that they have been referred to as marine — and so they were, for at that time ocean water extended in the form of a shallow sea, perhaps not more than 600 feet deep, over much of the interior of the present North America.

"These crinoids belonged to a group of animals called *enchinoderms* . . . [echinos — Greek for hedgehog], their name having reference to the fact that some at least were spiney-skinned like the present sea urchins. Relatives of the group included starfish and sea urchins; these and the crinoids have

representatives in the seas of today. These particular crinoids were small, the fleshy part rarely more than an inch across. Individuals lived in a thimble-shaped enclosure composed of a mosaic of many small polygonal, calcareous plates fitted edge to edge. This *calyx*, as it is generally called, was attached at the base to a flexible stalk composed of thin cylindrical, button-like plates superimposed like buttons on a thread. In a few of the LeGrand species, the stalks were up to ½ inch in diameter. The stalk, known also as the stem, might be a foot or so long; it had root-like tendrils called *cirri* at the lower end, which served as a means of attachment to the muddy sea bottom. From the upper part of the calyx, thin shelly flexible arms extended a few inches, waving in the ocean currents, bringing in food to the crinoid. These shelly parts are often spoken of as the skeleton of the animal, though of course it should be understood that they are not skeletons in the sense they are thought of in mammals.

"With death, the shelly calyx and stalk gradually fell apart. In places, the sea bottom sediment came to be comprised, in large part, of the remains of these crinoid skeletons, although of course the shells of other marine organisms were also present. But, most remarkably, in some places these delicate crinoid skeletons did not completely disintegrate. Instead, the stalk and calyx dropped over into the mud of the sea bottom, at least partially intact. This happened only in restricted areas, perhaps no more than a rod or so across, in what today are called nests or colonies. Then the crinoid remains were rapidly buried in limy mud deposited on the sea bottom.

"Millions of years went by. The sediment composed of crinoid fragments, and the layers containing the crinoid nests, were covered up by more limy sediment. There may have been some hundreds of feet of it. It all gradually hardened to the rock we call limestone."

It might be added here that though crinoids are rather rare in the oceans of the world today, they were exceedingly abundant at this time, and in fact, the period is sometimes referred to as the Age of Crinoids. Time and again the seas withdrew, allowing weathering and erosion by running water, wind and glaciers to cut into the limestone; then the seas

A remarkable slab showing three Batrocrinus macbridei in very nearly perfect condition D. M. Reg. & Trib. Photo

advanced again to build up additional layers of limestone and shale. Dr. Gwynne continues:

". . . [a] long lapse of time gave the elements an opportunity to wear down the land. River systems developed, for the rain water had to run off. A predecessor somewhat along the course of the present Iowa River was at work, and was cutting a valley through Iowa, and more particularly for us, through northeastern Marshall County just to the north of LeGrand. Valley development was interrupted by the advent of glacial ice some three of four hundred thousand years ago. But in any case, the river and its tributaries have been at work for a long while, bringing the land into the condition in which we see it today. Also, and this is important, the shale beds and the limestone beds above the crinoidal limestone had been worn away, and the river had cut down into the limestone containing the crinoids. The beds composed of crinoid shell fragments, and now called crinoidal limestone, were right at the surface. So were some of the nests where the crinoid skeletons were more perfectly preserved. The beds were exposed as cliffs along the Iowa River, where the river had formed a narrows or gorge in cutting through them.

"Of course the atmosphere and rain were still at work on the limestone. Pieces of the crinoidal limestone were etched by weathering so that their makeup of crinoid fragments was apparent to the examining eye. Here and there a nearly complete crinoid calyx may have weathered out, to lie on the slope and gradually disintegrate.

"Who was the first human to notice these odd-looking objects? Did the Indians of the area ever wonder about them? Well, at least we know that in some areas they discovered sections of the stalks and used them as ornaments, . . .

"And then came the white man. The earliest record we have of recognition of these crinoidal remains by early scientists is in the work of James Hall, the first state geologist of Iowa in 1858. There may have been others among the pioneers who were curious about these strange markings in the rocks. Certainly they were early recognized as fossils, the remains of life now extinct. They so strongly resembled flowers that they have been called sea lilies or stone lilies.

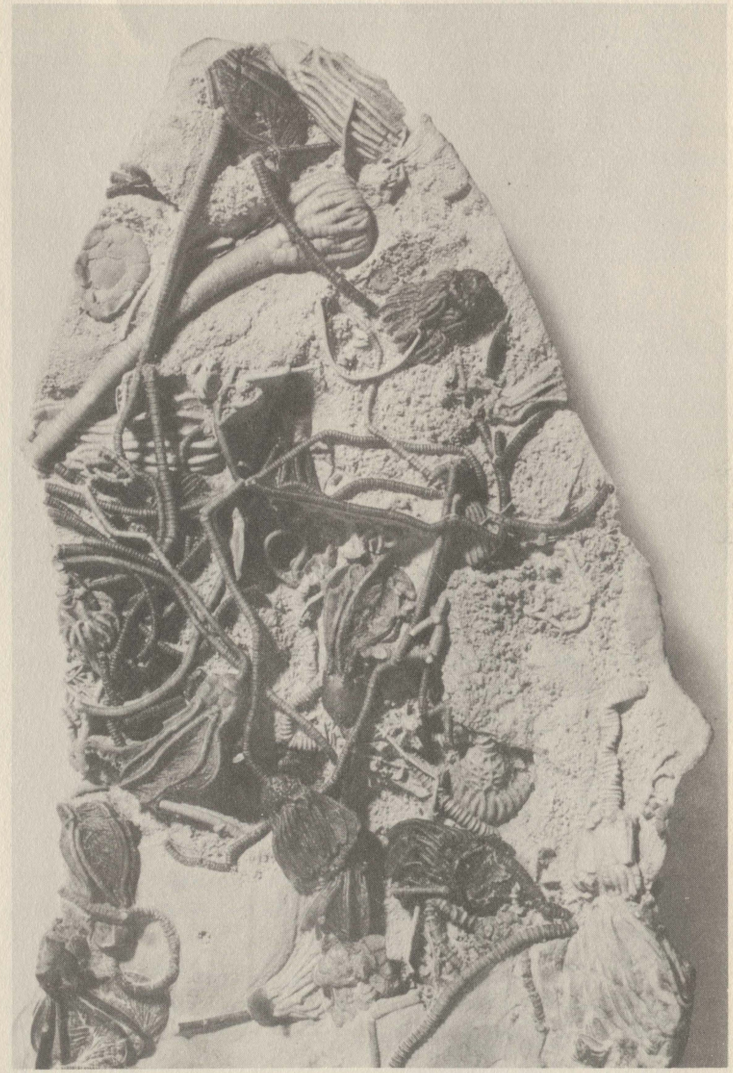
The flower-like crinoids have often been called sea lilies or stone lilies. A blastoid may be seen at bottom center. Museum Photo

Then Charles Abiathar White referred to them in 1870, in his report on the geological survey of the state of Iowa. Quarrying of the limestone developed around 1860, on the south side of the river, and in June, 1874, the nest from which random specimens had come was discovered in the middle of the quarry section."

Perhaps the greatest and most intriguing mystery concerning the fossils at LeGrand is the perfection of their preservation. What rare set of conditions could have existed to cause the formation and preservation of these few small nests containing some of the finest and most valuable clues to the early history of life on our earth? Why is it that similar nests of fossils are not found in another similar quarry less than one mile distant? Why is it that those nests that were found were relatively close together and not scattered throughout the quarry? Why were the fossils even in nests instead of being scattered evenly in their stratum? The answers are not easily found and may never be known for certain, but with considerable caution tempered by an awareness of the lack of information available, an attempt can be made to describe a set of circumstances which could explain away much of the mystery.

Let us consider the problem of the crinoids and starfish being found in great abundance in the small nests. Some writers in the past have believed that the nests represent highly populated colonies of these animals which died and were buried in essentially the same spot that they lived and flourished so many millions of years ago.

Serious objections to this idea become evident when the slabs are closely examined. If it was a case of simple death and burial, the stem sections would generally descend through the bedding plane and terminate with their root-like anchoring devices at, or near, the bottom side of the slab. Such is not the case. In fact, the stems are usually horizontally arranged within the bedding plane. Though their direction is random, they are only occasionally intertwined. Their arrangement is very similar to that which would be assumed by strands of limp spaghetti mixed into a slurry of mud and then slowly poured into and allowed to settle to the bottom of a large pot of water.



A portion of a small slab cleaned by a technique recently developed at the Iowa State Historical Museum Museum Photo

In over 99% of all the stems observed, it is found that their lower end with its root-like anchoring devices is broken off, and this broken part is completely missing from the slab. It is the logical place for the stem to break, as it grows increasingly small at this end. From this, it would seem that the crinoids were torn, or otherwise freed, from their attachment to the ocean floor. If so, they would have been completely at the mercy of the currents of the ocean floor which were apparently strong enough to move them from their original location, but not so violent as to damage them appreciably.

How then were these loose crinoids gathered into the nests where they were found? Perhaps the best clue to this is the observation that each of the nests were found to be cradled within a shallow depression in the rock below it. It can be easily shown that materials carried by a current, materials that are slightly heavier than water, such as sand or silt, tend to settle out in any sheltered area where the current is lessened. The depressions where the nests have been found would offer considerable shelter from a strong current, and it could be expected that they would soon fill with solid material such as sand, mud, and perhaps small animals such as crinoids, sea urchins, and starfish that could not easily escape. The fossils are found surrounded by a soft, fine grained, buff colored limestone that could easily have once been a limy mud which was carried along by these same currents. This mud could have smothered the animals and so, at the same time, both killed and entombed them. A rapid burial within a layer of mud would tend to exclude oxygen and retard bacterial decay, thus greatly improving the chances for the excellent preservation we see in the LeGrand fossils.

Shark teeth and spines are occasionally found in the quarry rocks, and it is known that sharks were contemporary with and commonly fed upon these fragile and defenseless animals. It is unlikely that such large choice groups of crinoids and starfish could escape from being eaten if they were as closely gathered together in life as they are in death.

Detail from the starfish slab showing the remarkable preservation
D. M. Reg. & Trib. Photo

The best argument against the idea that the crinoids were found just where they lived is revealed by the starfish slab. In some places we find these animals stacked three and four deep. It seems quite unlikely that they would have of their own choice gathered together in such abundance. Further, we find that about as many starfish are upside down as are right side up. Now starfish have a great aversion to being turned on their backs, and they tend to return to an upright position as quickly as possible — unless they are prevented from it, or are dead.

Starfish are far less apt to be preserved as fossils than are crinoids. This is in part because the small calcareous plates that make up their skeletons are very loosely held in place by a thin outer skin. While this allows for a greater freedom of movement in life, it also causes more rapid break up after death. In a few places on the arms of the starfish this "skin" is preserved, but apparently most of it lasted only long enough to hold the animal together until it was safely entombed in its muddy grave, and then it decayed without leaving a trace. Surely this indicates rapid death and burial. Since it is believed that the starfish slab came from the same stratum as the nests of crinoids, it is reasonable to claim that the crinoids were just as rapidly killed and buried.

What caused the limy muds to overwhelm these slow moving animals and be carried with them into the nests? Was it an underwater mud slide, which would be something like a land slide in slow motion? Perhaps it was the result of a storm or tidal wave. It may have been somewhat local in extent, as the pockets were all relatively close together.

Why is it that each of the forty species of crinoids found at LeGrand is colored in a characteristic way peculiar to that species alone? Are these colors indicative of the colors they wore in life? It is hoped that someday these mysteries, and others far more important, will be solved with clues that have not yet come to light, or have so far been overlooked.

When we view these slabs of prehistoric life, we are privileged with a rare experience — that of seeing with remarkable clarity an event that must be considered to have taken only an instant in the long history of the earth, an event that spanned at most a few hours, yet occured hundreds of millions of years ago.

Rhodocrinus kirbyi

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