STUDIES OF SILURIAN FOSSILS IN THE THOMAS A. GREENE COLLECTION AT MILWAUKEE-DOWNER COLLEGE

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The Thomas A. Greene Memorial Museum was established at Milwaukee-Downer College in 1913, the gift of the heirs of the collector. The mineral collection has been catalogued, but the fossil collection is so extensive that it has never been completely studied nor catalogued.

Thomas A. Greene was born in Providence, Rhode Island, in 1827. While still in grade school, he became interested in the study of geology and botany, and began collecting Rhode Island minerals, thus forming the nucleus of the present extensive geological collection. At the age of sixteen, young Greene went to work in a drugstore. Deciding to make this his life work, four years later he set out for the west, seeking a new home and his fortune. He arrived in Milwaukee July 4, 1848. Finding a drugstore for sale in Milwaukee, he bought it, and sent for his friend Henry H. Button. The firm of Greene and Button later gave up the retail drug business, and became a prosperous wholesale house.

The pressure of a growing business concern did not leave Greene much time for his hobbies; but the fact that he made his buying and selling trips in the summer, leaving winter travel to his partner Button, indicates that he may have made side trips to study geology and botany, as he did on his trip west at the age of twenty. By 1857, apparently the business was successful enough to permit Greene to go back to his mineral collection, and to enlarge and improve it, chiefly by purchases from dealers.

When his health failed in 1878, and his physician advised him to give up work for a while and spend as much time as possible outdoors, Greene turned, naturally, to examining the rocks in the vicinity of Milwaukee. These did not yield many minerals, but they were full of fossil forms.

It was not long before his interest was centered wholeheartedly on the collection of these fossils, and Greene, a perfection-

ist, set himself the task of building up as complete and perfect a fossil collection as he could. The circumstances were peculiarly favorable for such a purpose—Greene had the time to visit quarries, examine and study specimens, make exchanges and carry on an extensive correspondence. He had plenty of money to spend on fossils—he outbid the Public Museum on certain occasions, and made a practice of paying quarrymen in advance, to reserve the best specimens for himself; and it was a time when many new quarries were being opened. Through the 1880's and early 1890's, when he was collecting most actively, quarries were being worked which are no longer available, and Greene was able to obtain excellent specimens from the upper horizons as well as from the lower ones.

As Greene stressed in his letters concerning exchanges, the emphasis was on quality, not quantity. The quantity rose, however, to an estimated total of 65,000 to 75,000 specimens. The Silurian and Devonian fossils are by far the most abundant, since they are the ones which occur in and around Milwaukee. Greene determined to make his Silurian collection as complete as possible, and so, after scouring the quarries of Wisconsin and Illinois, he visited the famous locality at Waldron, Indiana, and also acquired some specimens from Niagara County, New York and Hardeman County, Texas. As the Silurian and Devonian collections grew, Greene began to collect fossils from all the other geological periods, acquiring some by personal field trips, but completing the collection chiefly by purchase and exchange.

Greene loved nothing better than to get to the quarries himself, and his correspondence shows that he frequently made such trips, usually writing to the quarrymen in advance, so that they would have an array of their finds ready for him to inspect. He was a busy man, however, and so he had to rely more and more on exchanges and purchases for his new specimens, rather than on collecting trips. He was very particular and meticulous in all his dealings. In general, he seems to have preferred to purchase material, rather than to obtain it by exchange. When he did make an exchange, he sent only the best material, and demanded similar quality in the specimens sent to him. After unsatisfactory dealings with certain men, he refused to examine any more of their material, complaining that it would be a waste of time. Their boxes were returned, unopened.

Because of his interest in the fossils, Greene trained himself to be a thoroughly competent paleontologist. He read a great deal, and studied his acquisitions carefully, labeling many of them quite completely. Others, however, were left unclassified. Greene did not hesitate to call on the leading paleontologists of the day when he was at a loss to identify his specimens, nor when he found something unusual. The labels contain notations by James Hall, Charles Wachsmuth and Robert P. Whitfield. Greene's notes indicate that from time to time these men suggested that probably he had new species in his collection. These suggestions have been noted in the present study, but there has not been time as yet to verify or disagree with them. In some cases, new species of brachiopods actually were described by James Hall. Some of these were named after Greene, an honor which pleased him highly.

Except for a preliminary study of the type specimens in the collection, the present work has been confined to Niagaran fossils from Illinois—almost entirely from Cook County. They are from quarries at Bridgeport, Cheltenham, Cicero, Hawthorne, Lyons and Stony Island. Practically all of these localities now are inaccessible to collectors. The collections include, altogether, more than 7,400 specimens which have been examined and listed by the authors. Many of the identifications are tentative, however, and more thorough work is necessary before the classification can be considered final. It is highly probable that there are new species in the material that has been studied, but final judgment is withheld. The greatest number of new species probably will be described from the Crinoidea; others will be from the Cystoidea; and probably a few Mollusca, Brachiopoda and Anthozoa. It is fortunate that the probable new species are represented by a large number of specimens in most cases, and it is hoped that the same forms may be found in other collections.

Aside from the finding of new species, the work has been very interesting because of the wide variety of species represented, and the excellence of the material. Some forms are extremely abundant; others are labeled "rare" and are represented by relatively few specimens. In some cases, where certain species never before described from Cook County have been found, new evidence of the faunal population of Silurian seaways may be inferred.

The compilation of species has not been completed, but an idea can be given of the generic range in the Niagaran rocks of Cook County. Porifera are relatively scarce, and are represented by two or three genera—*Ischadites, Receptaculites,* and an undetermined "rare" form. Corals are much more abundant, and are represented by at least 16 genera. Both solitary and colonial forms are present. Bryozoa are chiefly of the fenestellid group, but there are a few others. Brachiopods are present in great abundance, with at least 29 genera, representing both the Inarticulata and the Articulata. There are good representations of internal spiralia, as well as the more common features. The Echinoderma are also extremely well represented. There are at least 5 cystoid genera, 1 or more blastoids, and 20 or more genera of crinoids, representing a large number of species. Mollusca are represented by large and small Pelecypoda, Gastropoda and Cephalopoda, involving at least 9, 18, and 13 genera respectively. The Arthropoda are represented by about 15 genera of trilobites, of which *Bumastus* is the most abundant.

Further studies probably will reveal additional genera. There is no doubt that the number of species is large, and the abundance of specimens permits comparisons which may yield interesting results.

GENERA REPRESENTED IN NIAGARAN MATERIAL FROM COOK COUNTY, ILLINOIS

(*List is tentative and incomplete.*)

Sponges
- Receptaculites
- Ischadites
- Cerionites

Corals
- Zaphrentis
- Amplexus
- Streptelasma
- Diphyphyllum
- Omphyma
- Chonophyllum
- Strombodes-Arachnophyllum
- Cystiphyllum
- Cystiphorolites
- Heliolites
- Favosites
- Alveolites
- Cladopora-Coenites
- Syringopora
- Halysites
- *Stromatopora*

Cystoids
- Holocystites
- Caryocrinites
- Hallicystis
- Coelocystis
- Gomphocystites

Blastoid
- Troosticrinus

Crinoids
- Dimerocrinus
- Cyphocrinus
- Gazacrinus
- Lampterocrinus
- Siphonocrinus
- Archaeocrinus
- Lyriocrinus
- Melocrinus
- Macrostylocrinus
- Eucalyptocrinus
- Calliocrinus
- Periechocrinus
- Platycrinus
- Lecanocrinus
- Icthyocrinus
- Stephanocrinus
- Crotalocrinus
- Cyathocrinus

Bryozoans
- Ceramopora
- Fenestella
- Undetermined

Brachiopods
- Monomorella
- Trimerella
- Orthis
- Leptaena
- Stropheodonta
- Strophonella
- Schuchertella
- Triplecia

Parastrophia
Anastrophia
Conchidium
Stricklandinia
Pentamerus
Clorinda
Gypidula
Sieberella
Rhynchotreta
Uncinulus
Wilsonia
Camarotoechia
Rhynchotrema
Magellania
(Waldheimia)
Atrypa
Spirifer
Cyrtia
Homoeospira
Whitfieldia
Nucleospira
Meristina

Pelecypods
Cleidophorus
Edmondia
Cypricardites (?)
Pterinea
Ambonychia
Amphicoelia
Conocardium
Modiolopsis
Cypricardinia

Gastropods
Sinuites (?)
Tremanotus
Pleurotomaria
Phanerotrema
Murchisonia
Straparolus
Euomphalus
Raphistoma
Euomphalopterus
Trochonema
Cyclonema
Strophostylus
Holopea
Loxonema
Subulites
Cyrtospira
Platyceras
Diaphorostoma

Cephalopods
Orthoceras
Dawsonoceras
Protokionoceras
Kionoceras
Lituites ??
Gyroceras
Trochoceras
Actinoceras
Cyrtorizoceras
Cyrtoceras
Protophragmoceras
Gomphoceras
Phragmoceras

Trilobites
Illaenus
Illaenoides
Scutellum
Goldius
Lichas
Metapolichas
Arctinurus
Dicranopeltis
Ceratocephala
Encrinurus
Calymene
Cheirurus
Sphaerexochus
Dalmanites