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THE MINNESOTA GEOLOGIST

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OFFICIAL BULLETIN  
OF  
THE GEOLOGICAL SOCIETY OF MINNESOTA

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VOL. 1

OCTOBER 1944

NO. 7

C O N T E N T S

FOREWORD

THUMBNAILED SKETCHES: MRS. HELEN J. SOMMERS,  
MRS. CHARLES H. PRESTON, &  
MRS. ANNA KOLDERIE.

BULLETIN BOARD

ARTICLE: "INTERPRETING FOSSIL REMAINS"  
BY MISS THELMA SNEED.

EDITORIALS

OUR MAIL BAG

FIELD TRIPS REVIEW

ARTICLE OF THE MONTH  
"CARLSBAD CAVERNS"

Digest of an article by Carey Holbrook,  
in August 1944 issue of Compressed Air  
Magazine.

GEOLOGICAL SOCIETY OF MINNESOTA

831 SECOND AVE. SO.  
MINNEAPOLIS, MINN.

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The Geological Society of Minnesota is devoted to the study of geology and mineralogy for their cultural value.

OFFICERS

Joseph W. Zelusky, President  
Charles B. Howard, Vice President &  
Treasurer  
Loretta E. Koppen, Secretary

Mabel Williams, Director  
Leone Patricia Knox, Director  
Alger R. Syme, Editor  
Edward P. Burch, Counselor

PAST PRESIDENTS

Edward P. Burch  
Junior F. Hayden  
Alger R. Syme  
Charles H. Preston

Meetings: Our Society meets every Monday evening, not a holiday, in the large auditorium in the Museum, on the 4th floor of the Public Library at Hennepin Avenue and 10th Street, Minneapolis, Minnesota, at 7:30 P. M., from October to May, inclusive. From June until September, inclusive, we have a program of field trips. Visitors are very welcome, always. Dues, for those residing in Hennepin and Ramsey Counties are \$3.00 annually, plus \$1.00 additional for your wife, husband, or dependent family members; for those residing elsewhere, dues are \$1.00 per person.

#### FOREWORD

It is a revelation to most people to know that women take an active interest in the subject of Geology. 84 of our 196 members are women, and some of them are among our most enthusiastic and best-informed members.

In recognition of their devotion, interest and work, with respect to the Society, this issue of THE MINNESOTA GEOLOGIST is respectfully dedicated to them.

To emphasize these facts, it seemed appropriate, therefore, to have this issue of the Bulletin prepared by a woman for the women. MRS. LORETTA E. KOFFEN, our unusually efficient Secretary, willingly, though not without considerable trepidation, accepted this responsibility, and except for a meager outline of the general arrangement, and a few minor suggestions, she has planned, written and prepared the entire issue, and has even done the mechanical work of mimeographing and mailing, with a very minimum of assistance. To collect the information, put it into acceptable form and perform all the multitudinous tasks necessary for final publication requires real work, and we acknowledge her services with sincere appreciation.

To the women of our Society, GREETINGS!

ALGER R. SYME  
Editor

The subject of this Thumbnail Sketch is Mrs. Helen James Sommers, who, from the beginning, has been one of the most active members of the Geological Society. She has led us on many Field Trips and has often given talks on Geology to the Society. She has worked ceaselessly on maps and models for these meetings. Indeed, she is the "Dean of Women", so to speak.

Helen Sommers was born in St. Paul, Minnesota, and it was there she attended grade school and high school. Her maternal grandmother, then a widow with two little girls, moved to St. Paul from Maine in 1859. She secured a position as a teacher, and later, when a high school was founded, she was its first teacher and her daughter, one of the two in its first graduation class. From this same high school three generations of this family have been graduated, namely: Mrs. Sommers' mother, Mrs. Sommers herself, and her children.

After graduating from high school, Helen Sommers attended Radcliffe College for one year. While there, among other subjects, she studied physiography under Professor Wm. Morris Davis. This, she maintains, furnished her with a background for her later interest in Geology. The following ten years she spent teaching in private high schools in St. Paul.

Helen James and Henry S. Sommers, friends since high school days were married in 1909. They have four children, all of whom are married and live in various parts of the United States. One son is a merchant, one a physicist, and one daughter is a psychiatrist.

"We have," she says, "seven and a half grandchildren" or perhaps the number has increased to eight by now.

In 1924, she attended the University of Minnesota and studied Geology under Dr. W. H. Emmons. Later when extension courses in Geology were made available, she again attended the University, this time as an extension student.

She has worked diligently for the public schools; at the polls and in Parent-Teachers' work. She is now busily engaged in helping the war effort by converting her garden into a stock of canned goods. Last year she canned over 1100 jars of fruits and vegetables, of which she shipped 800 jars to members of her family in the East.

In addition to her many and varied activities, she found time, before the war, to travel extensively, in the United States, Hawaii, Mexico, Guatemala and Europe, accompanied on her more recent trips with a geological hammer.

Her husband was formerly a member of the firm of G. Sommers & Co., a wholesale merchandise concern in St. Paul. Two of her sisters and a brother are also interested in Geology. The brother, Henry C. James, formerly with the Northern Pacific Railroad Co. was one of the engineers of the Fort Peck Dam project and has lectured to the Society in the past. Her sisters, Margaret Burt and Linda Benitt, are prominent members of the Geological Society.

Helen Sommers plans to leave for Washington D. C. in the near future to join her husband, who is Chief of the Textile Division of the W.P.B. Her one regret in leaving is that she will miss the winter lectures. Needless to say, we shall miss her very much and we hope that she will return to us in the not too distant future.

L.E.K.



RUTH PEIRCE PRESTON was born near Germania, Wisconsin, and during her childhood lived on a 2000 acre farm that was bordered by Comstock Lake on one side and by the Mecan River on another.

Her grandparents were the spiritual leaders of a group of about sixty people who had migrated from Massachusetts seeking only freedom of worship. These people led a frugal, industrious and religious life. Children and grownups alike attended Prayer Meetings every weekday evening and each Sunday afternoon. It was in this austere, but gentle community household that Ruth Preston spent the early years of her life. During her "teens" she attended several private schools and later attended four years at Milwaukee Downer and two years at Oshkosh Normal School.

She was Assistant Principal of the High School in Westfield, Wisconsin, for one and one half years. It was there that she met her future husband, Charles E. Preston, our Past President. As stated in an earlier issue of the Bulletin, the Prestons have two daughters, Katherine Bradway, Ph.D., and Lucile Jesson. Her mother, Mrs. Annette S. Peirce, is at present living with the Prestons. This remarkable woman is ninety one years young. She is a very charming and active person, as was evident to those who attended the last field trip meeting at the Prestons' Lake home.

Besides being an active member of the Geological Society, Mrs. Preston is a Past President of the Prospect Park Study Club, and Past President also of the Prospect Park Parents & Teachers Association. She is also a member of the Minneapolis Womens Club. Another activity, one of her favorites, is swimming. She starts the swimming season very early in the spring, rarely missing a day throughout the summer and late fall.

Among her many accomplishments is the art of describing, in verse, her thoughts and experiences. After some persuasion, we did secure from her the following example:

#### CROCUS SLOPE

I know a pasture land of native sod,  
Its south edge beveled by a sloping bank,  
Whose clean, light, sandy clay,  
Too lean for hungry roots of grass,  
Holds ample nourishment for sweet-fern sprays  
And whole blue skies of crocuses,  
In tender April days.

That sunny, sloping bank, first thawed in spring  
Of any spot upon my father's farm,  
Is mellow now with fresh young life  
While winds and showers with firm, kind, mother-hands  
Stroke tousseled winter roughness  
Into smooth and comely strands.

Upon a nearby furrowed oak  
An emerald tree toad shrilly sings,  
Safe camouflaged from hostile eyes,  
As wedged in creviced moss it clings.

Youths path guides memory's pilgrimage  
To things that unmolested stand  
Where crocuses are coming up  
Like blue mist rising from the land.

The subject of this Thumbnail Sketch is Mrs. Anna Kolderie, known affectionately as "The Queen", who will tell her story in her own words.

I was born near Rotterdam, Holland. My father was a native of the Netherlands. My mother's family came from Brugge, Belgium.

When I was four years old, I did my share of the work, just as every child in Holland is expected to do. My job was to wind the yarn my mother and older sister used for knitting the family's garments. All children in Holland are taught to knit when very young. The girls in our family were expected to knit seven inches on whatever they were knitting, before being allowed to play.

When I was quite young, I liked school so well I would often follow my older sister to school, coaxing the teacher to let me stay. When old enough to enter school, I was put into the second grade, for I had learned much from these early visits.

We attended school five and a half days a week, with only two weeks of vacation during the summer, one week at Christmas and one week at Easter. I often dreamed of America, and wished I could someday see it.

After graduating at the head of my class, I was given an opportunity to go to normal school in another city. There, I lived with an aunt, who was extremely religious. We weren't allowed to prepare any meals on Sunday, and all food was prepared before midnight on Saturday. I spent long, tiresome hours in Church on Sunday, and was often restless, and sometimes hungry. Later I went to the Hague, to be a companion to a middle aged lady whose husband was a geologist. I spent hours in his library, trying to decipher the German in which his geology books were written, and was fascinated by the pictures of volcanoes and earthquakes.

It was while in the Hague, that I met and married my husband. We moved to Haarlem, and our three children were born there. My husband worked for the Dutch Railroad, and had what was considered to be a good job, although his salary was small and living expenses were high. With three children, we found it very hard to make ends meet, and though we realized it was a big step to take, we finally decided to come to America. Relatives living in America loaned us the three hundred dollars we needed for passage, and by sailing second class, we avoided the stop at Ellis Island. After bidding farewell to our friends and relatives, we sailed for America on April 27, 1912.

On arriving here, we went directly to Hull, Iowa. Four months later, we moved to Minneapolis. The first two years were difficult ones for us. However, after that, we were able to pay back the three hundred dollars. That was an eventful day in our lives. A short time later, we bought our first home, and after that, things were easier for us. In due time, we were able to send our children to college, just as we had planned. Theodore, Jr., graduated from Carlton, Adrian from the University of Minnesota, and Dena, from Miss Woods Kindergarten School.

While on a trip to Yellowstone Park in 1940, I met Mrs. James, Mrs. Sommers' sister-in-law, who interested me in the Geological Society. I have taken several courses in geology and mineralogy in the Extension Division of the University, and I have missed few lectures or field trips sponsored by our Society.

EDITOR'S NOTE: Mrs. Kolderie has been a zealous worker for the Red Cross and has just earned a chevron for devoting many hours of time to the making of surgical dressings during the past four years. She was also one of the first women to serve on the jury in Hennepin County.

# STATE OF MINNESOTA

-1-  
GENERAL LANDSCAPE AND RIVER SYSTEM

RED  
LAKE

-2-  
GUNFLINT AND  
VERMILION RANGES

TOWER  
HIBBING VIRGINIA  
NORTH SHORE  
LAKE SUPERIOR

3-4-5  
3-4-5  
MESABI RANGE

DULUTH  
7  
JAY COOKE PARK

BRAINERD  
8  
CUYUNA RANGE

10

-10-

ST. CLOUD GRANITES

-9-  
TAYLORS FALLS

ST. PAUL

12

-12-  
TWIN CITIES REGION

THE MINNESOTA  
VALLEY 11

-11-

THE MINNESOTA VALLEY

-15-

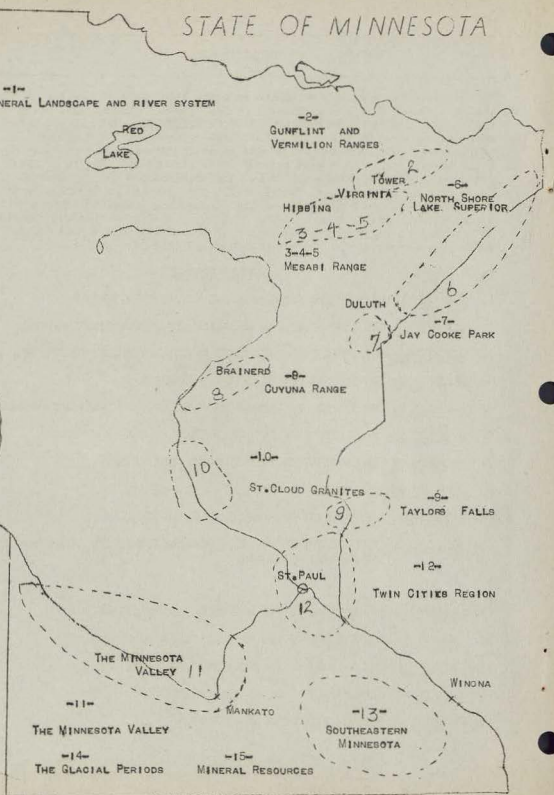
-14-  
THE GLACIAL PERIODS

MINERAL RESOURCES

-13-

SOUTHEASTERN  
MINNESOTA

WINONA



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\* BULLETIN BOARD \*

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We think we are extremely fortunate in again being able to present to the public a course of fifteen lectures by DR. GEORGE A. THIEL, HEAD OF THE DEPARTMENT OF GEOLOGY OF THE UNIVERSITY OF MINNESOTA. This is the third such course given by Dr. Thiel. The first covered all the geologic processes by which the surface of the earth is carved, and resulting geologic effects. The second covered earth history and results of these processes through all geologic time. The third covers the application of these principles to our own State, with a more particular description of different sections of the State having outstanding geologic interest or significance. If you miss a single lecture, you will be cheating yourself. If you don't bring your friends, you will be denying them a real treat. Bring your friends! The lecture subjects and dates are as follows:

No. 1944

LECTURE SUBJECTS

1. OCTOBER 9: THE GENERAL LANDSCAPE, AND RIVERS OF MINNESOTA;
2. OCTOBER 16: THE GEOLOGY OF THE VERMILION AND GUNFLINT IRON RANGES;
3. OCTOBER 23: THE GEOLOGY OF THE GIANTS RANGE AND RELATED STRUCTURES;
4. OCTOBER 30: THE GEOLOGY OF THE MESABI IRON RANGE;
5. NOVEMBER 6: THE GEOLOGY OF THE ORE DEPOSITS OF THE MESABI IRON RANGE;
6. NOVEMBER 13: THE GEOLOGY OF THE NORTH SHORE OF LAKE SUPERIOR;
7. NOVEMBER 20: THE GEOLOGY OF THE JAY COOKE PARK REGION;
8. NOVEMBER 27: THE GEOLOGY OF THE CUYUNA IRON RANGE;
9. DECEMBER 4: THE GEOLOGY OF TAYLORS FALLS REGION;
10. DECEMBER 11: THE GEOLOGY OF THE ST. CLOUD GRANITES, AND RELATED ROCKS OF CENTRAL MINNESOTA;

1945

11. JANUARY 8: THE GEOLOGY OF THE MINNESOTA VALLEY REGION;
12. JANUARY 15: THE GEOLOGY OF THE TWIN CITIES METROPOLITAN AREA;
13. JANUARY 22: THE GEOLOGY OF SOUTHEASTERN MINNESOTA;
14. JANUARY 29: MINNESOTA DURING THE GLACIAL PERIODS;
15. FEBRUARY 9: MINERAL RESOURCES OF MINNESOTA;

Note: The various localities of our State described in these lectures are indicated by the same numbers on the accompanying map.



Furthering interest in Paleontology is dependent on several factors. Some of these are as follows: First, when and how to find fossils is important. When specimens are collected, the second step is to identify the organisms. Third, it is quite interesting to imagine what these individuals looked like in their natural habitat, and how they lived and reacted to other individuals, to their enemies, etc. This last has led to a very interesting field of speculation.

The first investigators to delve into this combination of Art and Paleontology were hampered by the lack of materials and data, by erroneous classifications of fossil remains, by errors in drawing conclusions from their evidence, and by adverse opinions of other Paleontologists. O. C. Marsh, a Paleontologist, wrote in 1895, "The dinosaurs seem ----- to have suffered much from both their enemies and friends. Many of them were destroyed and dismembered long ago by their natural enemies, but more recently, their friends have done them further injustice in putting together their scattered remains and restoring them to supposed life-like forms ----- so far as I can judge there is nothing like unto them in the heavens, or on the earth, or in the waters under the earth." Although he was optimistic that satisfactory results could be reached later on, in his opinion restorations of importance to science were not then possible. Still, by this time, the "foundations for the art that was to make fossils live" were laid mainly by the following three early investigators, namely: Cope, Marsh, and Leidy.

When finally put on a more scientific basis, the interpretation of fossils became a fascinating subject. One of the first methods of procedure was to try to figure out from a fossil bone, from which type of an animal it came, which type of an individual that animal most nearly resembled, and then guess the use of that bone and its relationship to that animal. Later, in 1898, Caborn presented another plan which really placed this field on a solid basis. He and his artists mounted the fossils in life-like poses and tried to correlate them with the postures and skeletons of modern forms. Then they tried to visualize them swimming, walking, flying, dodging enemies and performing other functions necessary to life - in other words, restoring vitality to the remains of these ancient beings.

Some techniques used to get the above effects were to make wax models "in accordance with the proportions and muscular indications of the skeleton. From evidence at hand he was able to draw conclusions about the feeding habits of the animal, and its attitudes, as shown by the positions of the joints and the angles of feet and limbs. Then, to get the solidity of three dimensions on paper, and to reproduce shadows of the animals on the ground, the models were placed in sunlight, and the paintings made from them." Another method employed clay models and pen and ink drawings of the skeletons. Then cut-outs were made which were arranged in realistic poses.

"The art that has interpreted the life work of America's Paleontologists, as we have seen, has been more than technical illustration - it has often been fine art. ----- They have approached their subject with more than ordinary understanding of animal anatomy." They have worked, for the most part, with material which required a happy blend of imagination and scientific precision; material on which they must exercise skill and patience under the eyes of scientists who would not approve work in which imagination had run away with fact."

Reference: The FEBRUARY SCIENTIFIC MONTHLY for 1943, which contains a very fully illustrated article by Clayton Hoaglund, "They Gave Life to Bones", which describes the history of the development of interpreting fossil remains.

"Fools rush in where Angels fear to tread." Perhaps that is what I have done in assuming the responsibility of editing this issue of THE MINNESOTA GEOLOGIST. However, gathering the necessary material was truly interesting and enjoyable. To find such a wealth of genuine interest and enthusiasm concerning Geology among our lady members is indeed gratifying.

I wish to thank the Editor for his generous and able assistance, Miss Sneed for her article "Interpreting Fossil Remains", Mrs. Sommers, Mrs. Kolderie and Mrs. Preston for their splendid cooperation in supplying material for the Thumbnail Sketches.

Here are some interesting statistics, compiled from our membership records: The Geological Society has a total membership of 196, of which 84 are women. There are 26 married couples. 124 members reside in Hennepin County, 52 in Ramsey County, and 20 members outside of these two counties. In our diversified group we have 39 housewives, 25 engineers, 23 teachers, 14 lawyers, 7 physicians, 7 professors, 5 business proprietors, 4 secretaries, 3 dentists, 3 nurses, 3 insurance men, 3 accountants, 3 chemists and 2 contractors.

PRIVATE EVA JONES of the WACS and one of the most prominent members of the Society since its beginning, is now stationed in Elmira, New York, for special training. She is with the Motor Corps. Division. Eva Jones was a director of the Society for several years and while here missed very few field trips or lectures. Best of luck to you, Eva.

MISS JEAN GEE one of our newer members, has accepted a position with a Mission Hospital in Liberia, Africa. She will act in the capacity of Supervisor and will teach native girls to care for the sick when they return to their native villages. We all wish her success in her new venture and sincerely hope she won't forget the Geological Society. Good luck, Jean!

Hats off to MR. GEORGE RICKERT for securing so many new members! He never misses an opportunity to interest someone in Geology or in the Geological Society. He is responsible for adding at least seven new members since last spring.

Mr. Syme, our Editor, says that he has two new ideas for the Bulletin, if we should decide to publish it again next year. One is, to publish consecutively through the year, a series of paleogeographic maps, showing the invasions of the sea on the North American Continent during the various geologic periods. The other is to publish a series of short one-page lessons on geologic subjects, illustrated with drawings, the whole to form a brief, very brief, course of instruction in certain geologic subjects. He would like to know what you think of these ideas.

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\* OUR MAIL BAG \*

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FROM: W. H. EMMONS, Ph.D.:

Minneapolis, Minnesota

Thank you, fellow geologists, for the kind resolution you sent on the occasion of my retirement. You are doing a very useful work, and I wish you the best of luck always.

Faithfully yours,

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FROM: CLINTON R. STAUFFER, Ph.D.:

Sierra Madre, California

I have a very favorable impression of the work the Geological Society of Minnesota is doing, both for its members and for the Science of Geology itself. Therefore, the friendly resolution adopted by the Society on the occasion of my retirement from the University of Minnesota is especially appreciated. You have always been most kind and generous to me. If there is anything that I can do from California for the Society or its membership, kindly let me know.

Very truly yours,

\* \* \* \* \*

FROM: FLORENCE SYLVESTER WINCHELL, (MRS. A. N. WINCHELL): Madison, Wis.

To have in a geological society such keen verbarians as made your crossword puzzles is amazing! It is more of a puzzle to me how they can be made than to decipher them! I thought only rare experts of fathomless lingual erudition could create them, and then to find such a phenomenon among geologists! Oh, well, I should not be astonished at anything they can do.

I address myself to you . . . . ., with a suggestion. Why not collect them all, and when there are enough of them for a small pamphlet, have them mimeographed and put together for sale at a very small amount to use in place of Xmas or birthday cards to geologist friends? It might be very successful . . . . .

With pleasant remembrance of our visits with you, and greetings from Mr. Winchell,

Very sincerely yours,

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FIELD TRIPS REVIEW

Once again the Field Trip season has come to a close and it has been a most interesting season. May we take this opportunity to thank Miss Hinchley, Chairwoman of the Field Trips Committee, the leaders of the various Field Trips, and others who have given so generously of their time, as well as our hosts who extended so graciously their hospitality to us. Trips prior to July 30th have been previously reviewed. Since the last publication of the Bulletin, we have had the following trips:

JULY 30th: Mr. and Mrs. Cole were host to the Society at their home in Kenyon, Minnesota. Those of us who have seen Mr. Cole's collection of geological specimens believe it is one of the largest and most conveniently displayed collections owned by any member of our Society. Mrs. Cole served salad and coffee to complete our picnic lunch. Afterwards, some of the members searched for fossils and specimens in the old river bed near the Cole home. Attendance, 30.

AUGUST 20th: The boat trip to Hastings was perhaps one of the most enjoyable trips of the season. Miss Hinchley arranged for the use of Mr. John Hawley's yacht and our leader was Mrs. Linda Bennit. Objective - to study the Hastings Faults. While this trip was not entirely composed of the fair sex, they did outnumber the men two to one. Attendance, 34.

SEPTEMBER 10th: The last Field Trip of the season was held at the Linwood home of Mr. and Mrs. Preston. We all enjoyed their genial hospitality, also the baked beans, coffee and watermelon. This interesting afternoon was climaxed with a lecture on the Twin City Basin by our Counsellor, Mr. Burch. Numerous maps and models were used to illustrate Mr. Burch's lecture. Attendance, 50.

L. E. K.

SICK LIST

MISS ELSIE HINCHLEY has been very seriously sick, but as "we go to press", it is reported that she is recovering and doing nicely. She can have no visitors or flowers, as yet, but can receive mail. Please write her a comforting line or two.

USE THE FOLLOWING FORM TO SECURE A NEW MEMBER:

- APPLICATION FOR MEMBERSHIP -  
G E O L O G I C A L S O C I E T Y O F M I N N E S O T A

I hereby apply for membership in the GEOLOGICAL SOCIETY OF MINNESOTA:

Name \_\_\_\_\_ Residence \_\_\_\_\_ Phone \_\_\_\_\_

Business \_\_\_\_\_ Business Address \_\_\_\_\_ Phone \_\_\_\_\_

I agree to pay the usual membership fee of \$3.00, plus \$1.00 for my wife (husband) or other dependent family member, if I reside in Hennepin or Ramsey County, Minnesota, or \$1.00 per person if I reside elsewhere. NOTE: If you include another member of your family, write their name on the line indicated below.

Other family member \_\_\_\_\_

Signature \_\_\_\_\_

Relationship \_\_\_\_\_

Address \_\_\_\_\_



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## THE CARLSBAD CAVERNS

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It was in 1901 that a young cowboy named Jim White first became curious about a mysterious opening in the earth from which a swarm of bats emerged each evening. With a Mexican lad as his only companion, Jim started in to investigate the hole, and to his amazement discovered that a maze of winding passageways led from it far into the earth. For many months the pair explored the underground wonderland, sometimes taking along provisions and remaining for days in the caverns. Smudge marks on the walls, and long lines of white string helped them to find their way back to the opening. Each time they made gave them a fresh view of new and mighty rooms with high and vaulted ceilings, lacy formations of rock, and huge columns built by a trickle of water that had dripped for thousands of years. Each exploration made Jim more sure that he had stumbled upon a natural wonder surpassing anything of its kind.

In 1923 he interested the U. S. Geological Survey in the project, and during that year the Geological Survey made an examination that resulted in an expedition sponsored by the National Geographic Society. The resulting report, published in the National Geographic Magazine of January, 1924, gave the caves national publicity.

Carlsbad Caverns was proclaimed a National Monument by President Coolidge on October 25, 1923, and the area was created a National Park by act of Congress on May 14, 1930. At that time it covered only a small space, but since then it has been expanded until now the Carlsbad Caverns National Park embraces 49,568 acres. Within its confines are located scores of grottoes of various sizes, most of them unexplored. The openings were made by the action of water in a massive limestone formation that was laid down in a shallow inland extension of the ocean some 200 million years back. The uplifting and folding movements that created the Rocky Mountains also raised the Carlsbad area above sea level. All this took place about 60 million years ago at the end of the "Age of Dinosaurs". Since then the streams have carved their deep gorges, the vast caverns have been hollowed in the limestone, and within them have been formed the amazing decorative deposits.

Many improvements have been made in the Carlsbad Caverns. Modern facilities have been provided and foot trails have been built. An electric-lighting system has been installed, along with a modern passenger elevator that whisks visitors up and down in jig time.

Some idea of the immense area of the corridors and openings in the Carlsbad Caverns may be obtained from the measurements of what is known as "The Big Room." This chamber is 4000 feet long and has a maximum width of 625 feet. The average height of the ceiling is 200 feet, although there are points where it is much higher. The floor space is about 57 acres in extent and could accommodate seats for 500,000 people or, roughly the entire population of the State of New Mexico. Within this room is "The Great Dome," a massive formation 62 feet high, 16 feet in diameter, and estimated to be 60 million years old. Here also is the huge "Rock of Ages", at whose base each party of tourists pauses to rest while every light is extinguished. This is no ordinary blackness. Around them is a deep, impenetrable Stygian night out of which comes the swelling notes of a pipe organ that go echoing along the mighty corridors until even the most hardened individual finds his eyelids wet and his lips forming the words of that ancient and soul-stirring hymn, "Rock of Ages, cleft for me, let me hide myself in Thee." Then, as the notes die away and back in some hidden recess an electric light winks into life, the silent throng gets quietly to its feet and, still under the spell of that sacred moment, moves silently into a brightly lighted and spotless dining room provided with



tables and chairs for the noonday lunch.

More than 40 years have swept by since Jim White discovered the Carlsbad Caverns, but the bats that attracted him continue to occupy their underground home in never-decreasing numbers. From October until April the creatures hibernate, hanging head down and seemingly lifeless from the walls and ceilings of a long corridor that extends 1/4 mile eastward from the main entrance and that is not open to visitors. During the other months they roam the countryside, swarming out at night to prey on insects and returning before dawn to their roosts 180 feet below the surface.

Beginning about sunset, the bats come pouring forth from the entrance in a spiral stream that looks like water flowing over a dam. The mass is seemingly unending and unbroken, and it takes at least three hours for the entire colony to get out of the cave. It has been estimated that three million of the creatures take wing and that they devour in a night's operations a little more than 11 1/2 tons of insects, including moths, beetles, flies and mosquitoes. Five kinds of bats are represented, but by far the most numerous is the Mexican free-tailed but which gets its name from the fact that its tail projects about an inch beyond the skin that stretches between the hind legs.

The actual size of the Carlsbad Caverns is not yet known, although many miles of passageways have been penetrated on the three main levels. The first is 740 feet underground. At a depth of 900 feet is a vast subterranean apartment, and 420 feet below that is still another. None of these levels has been completely explored. The dining room and all other improvements to take care of visitors is on the 740-foot level, and it is this one that is open to the public.

The trip through the Carlsbad Caverns covers a distance of approximately 7 miles, and after the inspection an elevator carries the sight-seers back to the surface. Work on the shaft started December 23, 1930. The first person to use it was the famous humorist Will Rogers who visited the caves with his wife a few hours after the shaft was blasted through, in May of 1931, and made the descent in a bucket on the end of a rope. The elevator was completed and put in operation on January 23, 1932. It is of modern electric type, with self-leveling cage carrying twelve persons, and operates at a speed of 700 feet per minute. With the exception of a few elevators in the Empire State Building in New York City, this installation is the longest single-lift passenger elevator in the world. The equipment contains all automatic safety devices found in usual building installations.

The Carlsbad Caverns are open every day in the year for visitors, who pay \$1.50 each for guide service. 2,219,405 people have visited Carlsbad Caverns since it was first opened. There is no fee for children sixteen years of age or under when they are accompanied by adults taking full responsibility for their safety and good conduct. A charge of 25 cents each way is made for every adult using the elevator.

NOTE: The foregoing is a digest of an article written by Carey Holbrook and printed in the August 1944 number of COMPRESSED AIR MAGAZINE.

L.E.K., Honorary Editor