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Progress in the Study of Nebraska Diatoma

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PROGRESS IN THE STUDY OF NEBRASKA DIATOMS

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For some time the writer has been engaged upon the study of the recent and fossil diatoms of Nebraska, including some that have been sent in from neighboring states, and hopes to be able to publish a detailed report of the work soon. As far as known very little attention is being paid to diatoms in this country at the present time. Being among the most striking and beautiful of microscopic objects, they received more than their due share of attention in the days following the invention of the microscope. Diatoms were not only collected and described by scientists, but were collected by others actuated by some such spirit as that of the modern postage stamp collector. This "diatomania" so disgusted real scientists that it was later considered a reflection to be known as a student of diatoms. For this reason the study of Nebraska diatoms is in its pioneer stage.

It may be well to briefly define diatoms. They are brown plants of microscopic size, which live in the water everywhere, and are also frequently found on damp ground. The brownish scum floating on water or coating damp ground is usually composed of diatoms. Some are especially abundant in streams in the winter, under the ice, and for a time in the spring after the ice disappears. Often the entire bottom of a stream is coated to a thickness of an inch or more with a brown, mucus-like slime, which consists almost wholly of diatoms. But by far the larger number of them are found mixed with the green slimes and scums in springs, creeks, ponds, rivers, and swamps, and under such conditions the brown color is not noticeable. Many diatoms have the power of swimming. In Navicula, the most common of freshwater genera, the individuals are boat-shape, and as seen under the microscope swimming through the water, their name Navicula, which means "little boat," seems especially fitting. But besides the swimming forms there are some that grow attached by stalks, some that are sessile, (that is, attached without a stalk), some that are united in long bands or threads, and some that are imbedded in a gelatinous mass.

In point of size the largest diatom yet found in Nebraska is one-eightieth of an inch long, and it would take about a hundred of the

smaller ones placed end to end to reach across the head of a pin. In form they are rod-shape, boat-shape, oval, elliptical, or circular.

Although they are so small, they are really of great economic importance. Springs, ponds, creeks, rivers, and the ocean are filled with them. They form a large part of the food of animals little larger than themselves, and these are in turn food for still larger ones, and so on until even the sharks and whales get part of their food indirectly from diatoms. Even the fish which are used for food by human beings can trace part of their food back to diatoms.

But in one way, diatoms differ from all other plants. They are enclosed in glass-like shells, which consist of opal, and when they die the shells persist. Hence remains of nearly all the varieties of diatoms that have ever lived are still in existence. In some places there are layers of earth many feet thick composed almost entirely of diatom shells. In California the depth of one deposit is 4,700 feet. This is known as Diatomite, "Infusorial Earth," or "Kieselguhr." It is a white or slightly brownish material and looks much like air-slaked lime. It may be easily distinguished from other substances of similar appearance by the fact that it is so light that when dry it will float on water. It is used for making some kinds of silver polish such as "Electro-silicon." It has great absorbing power, and when made to absorb nitro-glycerine becomes dynamite, though dynamite is now usually made from other material. Large quantities of it are also used as a filter in the refining of sugar.

The following uses of diatomite are quoted from Ries's Economic Geology:

P. 77. "The Summerland Field is of interest for the reason that Arnold believes the oil to have been derived from diatoms and other organisms found in the Monterey shale."

P. 204. "This material has been used to some extent for abrasive purposes either in the form of a polishing powder or in scouring soaps."

("Infusorial Earth and Tripoli are terms sometimes applied to Diatomaceous earth. Both are incorrect.")

P. 224. "Diatomaceous earth, on account of its porous character, was formerly used as an absorbent of nitroglycerine in dynamite, but little or none appears to be now employed for this purpose in the United States. It can be used for polishing powders, and as a non-conductor of heat has been occasionally utilized for steam boiler backing, for wrapping steam pipes, and for fire proof cement,

Mixed with clay, or even alone, it can be used for making porous partition brick and tile. Some of the California material can be cut into any desired shape, and used as a filter stone or even for building purposes.

In Europe, especially in Germany, it has of late years found extended application. It has been used in the preparation of artificial fertilizers, especially in the absorption of liquid manures, in the manufacture of water glass, of various cements, of glazing for tiles, of artificial stone, of ultramarine and various pigments, of aniline and alizarine colors, of paper, sealing wax, fireworks, gutta-percha objects, Swedish matches, solidified bromine, scouring powders, papier-mache, and a variety of other articles. There is said to be a large and steadily growing demand for it."

The known deposits of diatomite in Nebraska are not large enough to be of any economic importance. Although these deposits are of little commercial value, they are of great scientific interest. In this connection it should be stated that certain known beds of the State are five to six feet in thickness, and when the diatomite fields are fully explored they may have actual economic value. Among other things, they add their testimony to the fact that in Tertiary times, there were lakes scattered over our great sand hills region, with green scums growing luxuriantly in them. The diatoms that lived in Nebraska thousands of years ago look exactly like the ones now living here. Their evolution seems to have been completed ages ago.

So far, the writer has made out 205 species, which include many forms or so-called varieties. Of these only 11 are round diatoms, the other 194 being of the elongated type. It is interesting to note in this connection that the round diatoms seem to be the simpler and more primitive type, and among modern diatoms, they are typically marine. They are the typical forms found in the older fossil deposits. But the fossil deposits of Nebraska, none of which, as far as the writer's research discloses, are older than the Tertiary consist mainly of long diatoms. They are practically identical with the diatoms now living in the region. Some 107 species of fossil diatoms have been made out, and 100 of these have been found living in the State. The other seven are common freshwater forms, and may be located when a more complete study is made.

Friends of the writer have added to his collection of material and the following localities for diatoms in Nebraska are represented: Agate, Ainsworth, Andrews, Anselmo, Arago, Arbor, Ashland, Aspinwall, Atkinson, Auburn, Bellevue, Blue Springs, Brat-

ton, Brock, Broken Bow, Brownlee, Brownville, Callaway, Cedar Creek, Chadron, Cherry County, Clear Lake, Cook, Crawford, Crete, Dawson, Dewey Lake, Dismal River, Dunbar, Durly Lake, Emerald, Ewing, Fairbury, Falls City, Georgetown, Gordon Creek, Grand Island, Greeley County, Hackberry Lake, Halsey, Hemingford, Holt County, Humboldt, Ithaca, Johnson, Julian, Lincoln, Little Alkali Lake, Lodi, Long Lake, Long Pine, Louisville, Mason City, Meadow, Melia, Milford, Minden, Mullen, Nebraska City, Nemaha City, Niobrara River in Holt County, Omaha, Orella, Osage, Pawnee City, Peru, Pelican Lake, Plattsmouth, Pleasant Dale, Polk, Red Cloud, Roca, Ruby, Rulo, Salem, Seneca, Seward, Sheridan County, South Bend, St. Deroin, St. Paul, Stromsburg, Talmage, Tecumseh, Tekamah, Thedford, Valentine, Wahoo, Wann, Weeping Water, Willow Lake, Wheeler County, Woodlawn, and York. This may look like a large number of localities, but since there are about 1,250 towns in the State, only about 7 per cent. of the State, as indicated by towns, is represented, while 93 per cent. has been entirely untouched. Many of these places are represented by only a single sample, while a complete research would require hundreds.

The fossil material, except one collection furnished by Dean C. E. Bessey, has been secured from Professor E. H. Barbour and from Mr. and Mrs. Harold Cook. Fossil diatoms have so far been found in Nebraska only in the following counties: Cherry, Greeley, Wheeler, Thomas, Hooker, and Sioux.

The following papers concerning Nebraska Diatoms have been published:

Diatomaceae in Webber's Catalogue of Nebraska Flora in the report of the Nebraska State Board of Agriculture, 1889, p. 186.

Botanical Survey of Nebraska. Report on Collections made in 1892, p. 45.

Botanical Survey of Nebraska. Report on Collections made in 1894-5, p. 24.

Diatomaceous Deposits of Nebraska, E. H. Barbour, in the Proceedings of the Nebraska Academy of Sciences, Vol. V, 1894-5, p. 18.

Diatomaceous Earth in Nebraska, E. H. Barbour, Nebraska Geological Survey, Vol. I, 1903, p. 193.

Preliminary notice of a newly discovered bed of Miocene Diatoms by Eleanor Barbour, Nebraska Geological Survey, Vol. 3, Part 12, 1910

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