UNITED STATES DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

SCANNING ELECTRON MICROGRAPHS OF MODERN CHRYSOMONAD CYSTS FROM CASTOR POND, JEMEZ MOUNTAINS, NEW MEXICO

by

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80-1231

This report is preliminary and has not been reviewed for conformity with U. S. Geological Survey editorial standards or stratigraphic nomenclature

INTRODUCTION

This report is one of a series illustrating siliceous cysts from various localities. Although these cysts have been known for many years, they are so small that they cannot be observed in detail with optical microscopes. The recent development of the scanning electron microscope (SEM) has made possible much more detailed observations of the external features of these cysts, but as yet relatively few forms have been recorded in this way.

A major difficulty is taxonomic confusion. Many and perhaps all of these cysts are the resting stages of various algae of the phylum Chrysophyta; they will be referred to in the rest of this report as chrysomonad cysts, although other groups in addition to the Chrysomonadinae may be represented. Modern forms are found primarily in fresh water, and numerous authors have reported chrysomonad cysts from Holocene sediments (for example, see Nygaard, 1956). Older fossils have been recovered mostly from marine deposits, and are known as archaeomonads; whether the two groups are as distinct as this terminology suggests is not clear.

For an introduction to the literature on chrysomonad cysts and siliceous algal scales, the reader is referred to Adam and Mahood (1979a), a preliminary annotated bibliography on the subject.

The fossil archaeomonads have been described and named entirely on the basis of their cysts. This is not advisable with modern forms, because the cysts are the remains of one stage of the life cycle of algae that presumably already have legitimate taxonomic names. Proper cyst nomenclature therefore depends on establishing which cysts are produced by which algae. At the moment, we have only a very limited knowledge of the forms that exist, and almost no knowledge of the phycological pedigrees of the various forms.

The present work is directed towards expanding our knowledge of the various cyst forms and their geographic and environmental distributions. Taxonomic problems are ignored, and the various cyst forms are simply given numbers, which have been assigned arbitrarily. These numbers are consistent throughout all reports in this series, and are being used to tabulate where the various forms occur. (A list of the previous reports in this series is given in Appendix A). The approach used has been that of "splitting", as opposed to "lumping"; it may well be desirable to lump together many of the forms described here when more is known about them.

The SEM photographs are the most important part of this paper, and no attempt has been made to reduce them to words. Supporting data have been placed in the

captions. Sample preparation techniques are generally the same as those used for preparing diatom samples; details may be found in Mahood and Adam (1979b).

The purpose of these initial reports is to provide primary documentation of the occurrence of particular cyst forms at particular localities, and to provide a means by which the SEM photographs of the cysts may be placed in a permanent depository. Counts of the relative abundance of the various forms and interpretations of their significance have not yet been attempted, but must await a more complete understanding of the range of cyst morphologies.

We have illustrated all of the distinctive cyst forms found in the sample, using the best available photographs. In some instances we have included more than one photograph of a given form, but we have not included all of the photographs we have taken.

Negatives of the plates for this report are on deposit at the USGS Photo Library, and prints can be obtained (at your expense) by writing to:

U. S. Geological Survey Library
Photo Library
Stop 914
Box 25406, Denver Federal Center
Denver, Colorado 80225

SITE DESCRIPTION

The sample studied for this report comes from an unnamed pond, informally designated here as Castor Pond, that occupies a depression on a landslide terrace at an elevation of 2700 m in the Jemez Mountains, Rio Arriba Co., northern New Mexico (36 02'N, 106 37'W). The small (70 x 100 m) pond is fed by seepage and is favored by beavers, who have built houses in it. When the pond was cored on 12 July, 1976, the water was 1.5 m deep and 1.5 m below a poorly defined outlet. Rooted aquatic macrophytes that dominate the weedy pond-edge include *Potamogeton natans*, *Sparganium angustifolium*, *Glyceria borealis*, *Polygonum amphibium* and *Eleocharis macrostachya*. The surrounding forest is dominated by white fir, ponderosa pine and Douglas-fir, with aspens surrounding open meadows.

Late Holocene pond deposits unconformably overly late Wisconsinan age clays in the 1.6 m core from the center of Castor Pond. The last 1000 years is continuously represented by sediments averaging 35% dry weight loss after combustion at 600 C. The sample described in this report was taken from the top of the core, and thus represents modern conditions.

REFERENCES CITED

Adam, David P., and Mahood, Albert M., 1979b, A preliminary working bibliography on siliceous algal cysts and scales. U. S. Geological Survey Open-File Report No. 79-1215, 34 p.

Nygaard, Gunnar, 1956, Ancient and Recent flora of diatoms and Chrysophyceae in Lake Gribsø, in Berg, Kaj, and Petersen, I. C., eds., Studies on the Humic acid Lake Gribsø: Folia Limnologia Scandinavica, No. 8, p. 32-94, 12 plates.

Castor Pond, Plate A

scale bar = 3 micrometers

1 - Type 40

(aperture at top right; with adhering debris)

2 - Type 40

(aperture at top right)

3 - Type 187

(aperture at top right)

4 - Type 157

(aperture at top right; with adhering debris)

5 - Type 157

(aperture at top right)

6 - Type 188

(aperture at top right)

7 - Type 189

8 - Type 342

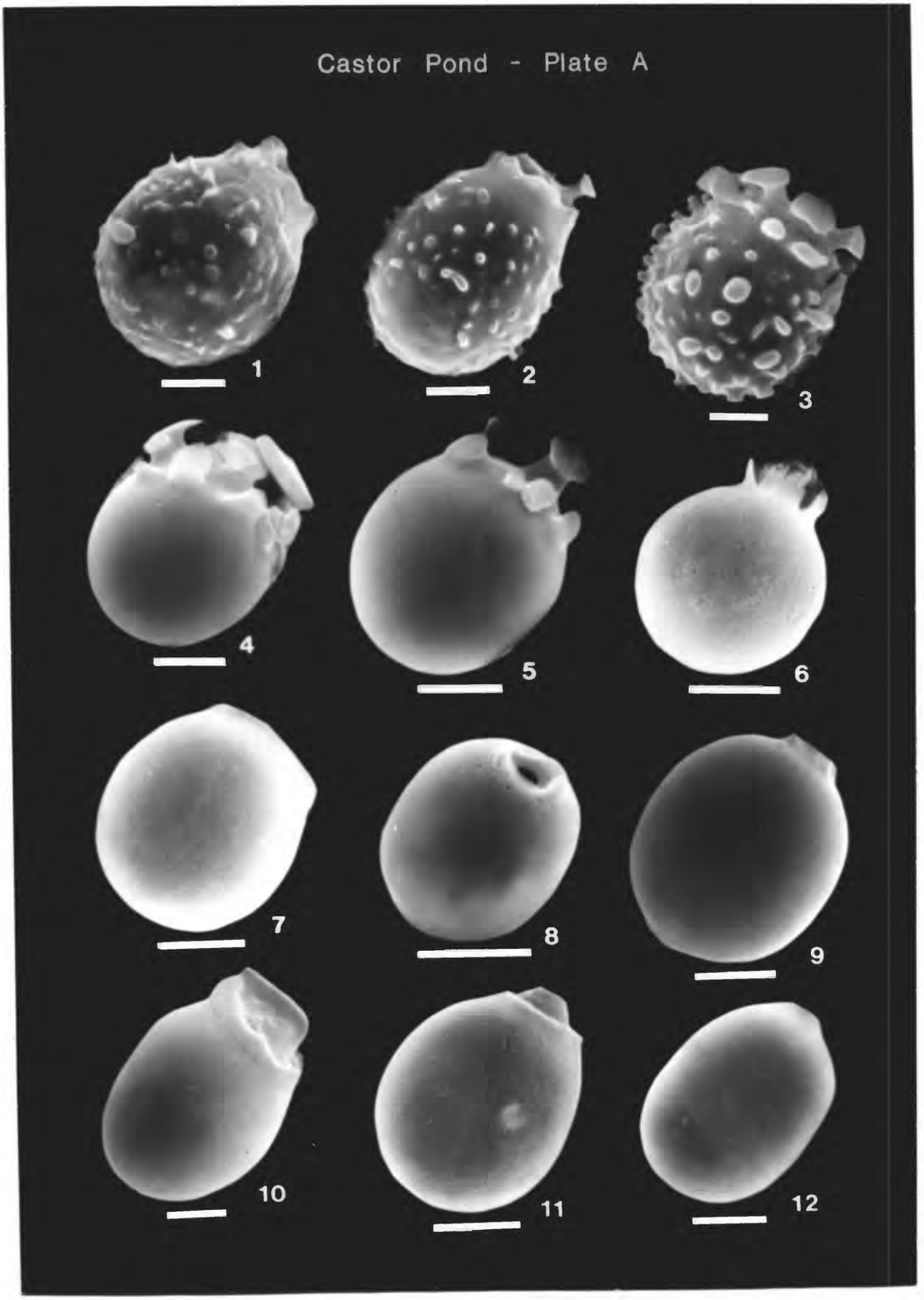
9 - Type 190

10 - Type 1

11 - Type 191

12 - Type 194

Castor Pond - Plate A



Castor Pond, Plate B

scale bar = 3 micrometers

1 - Type 194

2 - Type 194

(broken cyst, inside view)

3 - Type 194

4 - Type 195

(with adhering debris)

5 - Type 194

6 - Type 194

(with adhering debris)

7 - Type 195

(some background visible around edges)

8 - Type 194

(with adhering debris)

9 - Type 194

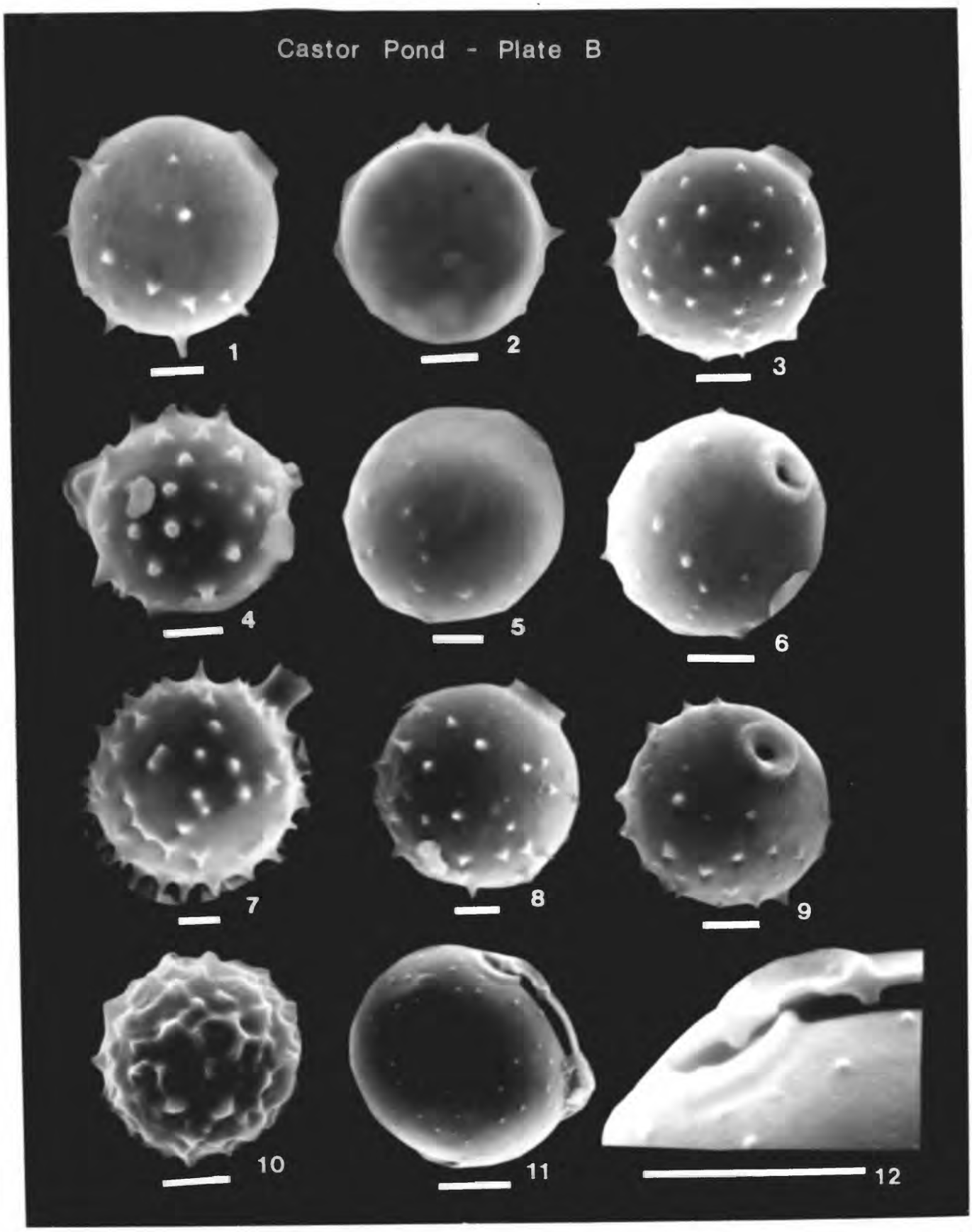
10 - Type 28?

11 - Type 197

(broken cyst)

12 - Type 197

(enlarged view of (11), showing cross-section through aperture)


Castor Pond - Plate B
1
2
3
4
5
6
7
8
9
10
11
12

Castor Pond, Plate C

scale bar = 3 micrometers

1 - Type 160

2 - Type 198

3 - Type 199

4 - Type 160

5 - Type 200

(with adhering debris)

6 - Type 201

7 - Type 160

8 - Type 202

(aperture not visible)

9 - Type 202

(aperture not visible)

10 - Type 160

(with adhering debris)

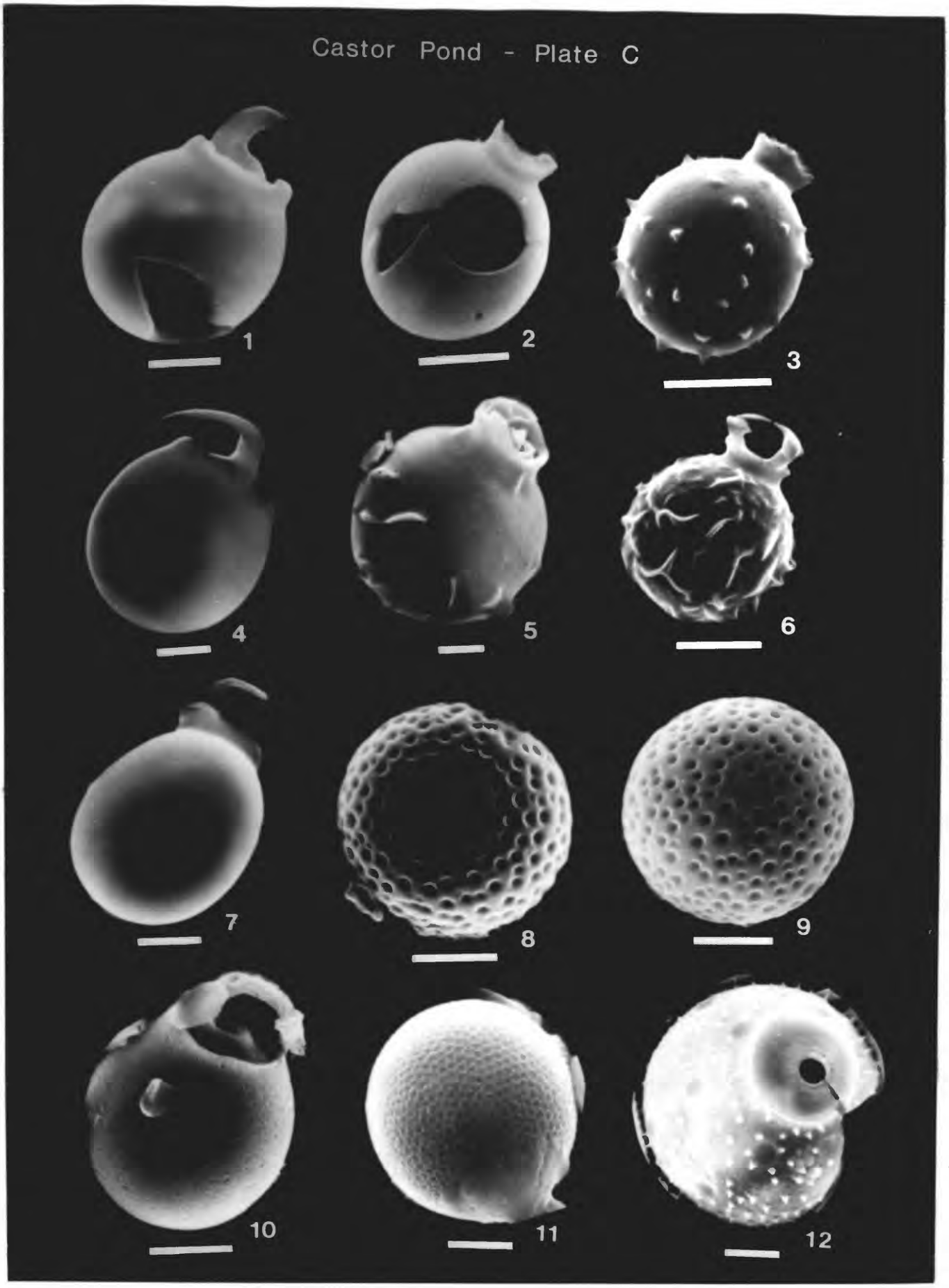
11 - Type 203

(with adhering debris; aperture not visible)

12 - Type 204

(some background is visible around edges)

Castor Pond - Plate C



Castor Pond, Plate D

scale bar = 3 micrometers

1 - Type 51

2 - Type 51

(with adhering debris)

3 - Type 51

4 - Type 205

(with adhering debris)

5 - Type 110?

(with adhering debris)

6 - Type 150

7 - Type 109

8 - Type 109

9 - Type 205

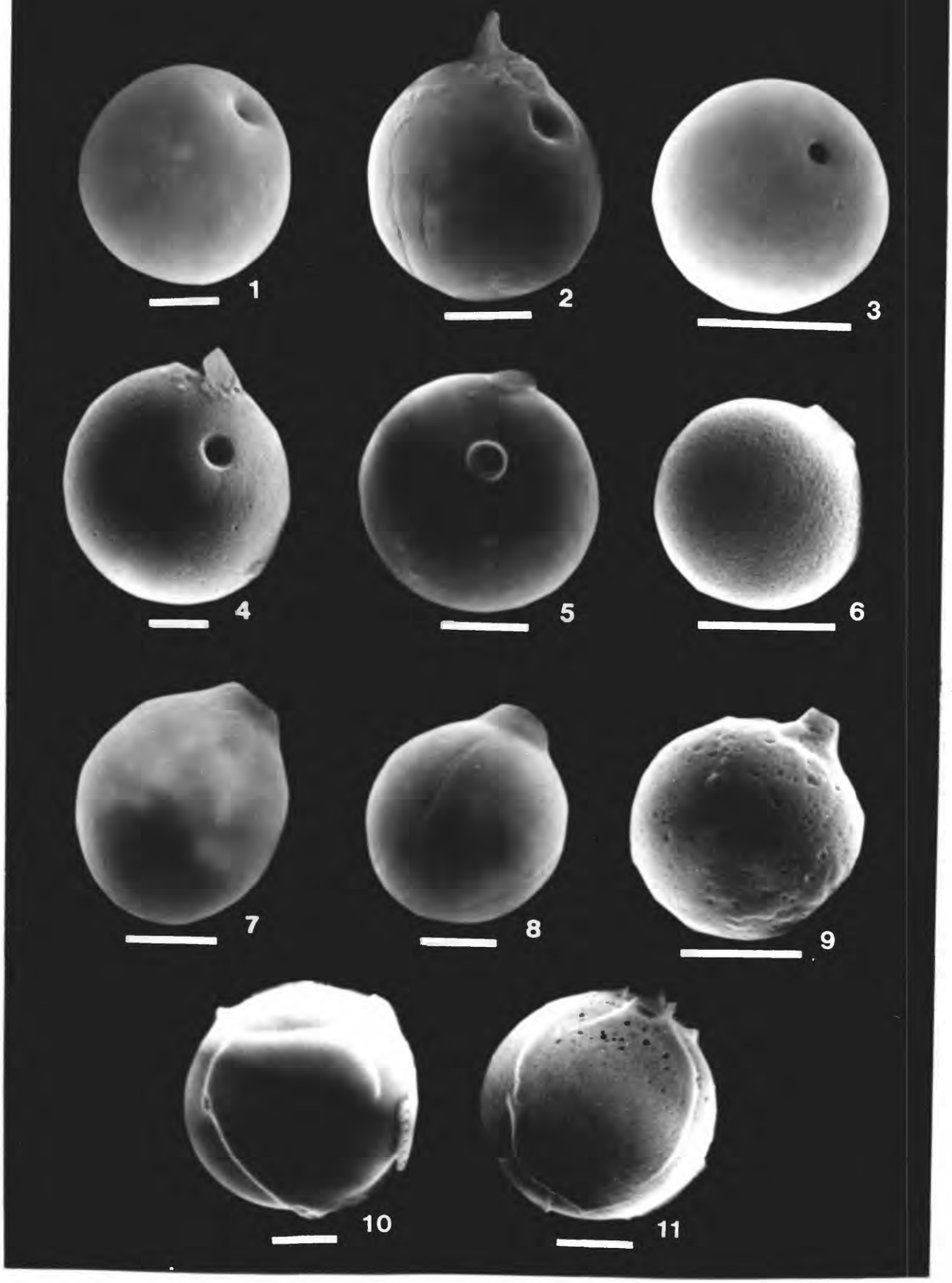
10 - Type 206

(with adhering debris; shading difference is an artifact; aperture not visible)

11 - Type 206

(with adhering debris; shading difference is an artifact; aperture at top right)

Castor Pond - Plate D



Castor Pond, Plate E

scale bar = 3 micrometers

1 - Type 207

2 - Type 207

(with adhering debris; aperture not visible)

3 - Type 207

(banding is an artifact)

4 - Type 208

(aperture not visible)

5 - Type 114?

(aperture not visible)

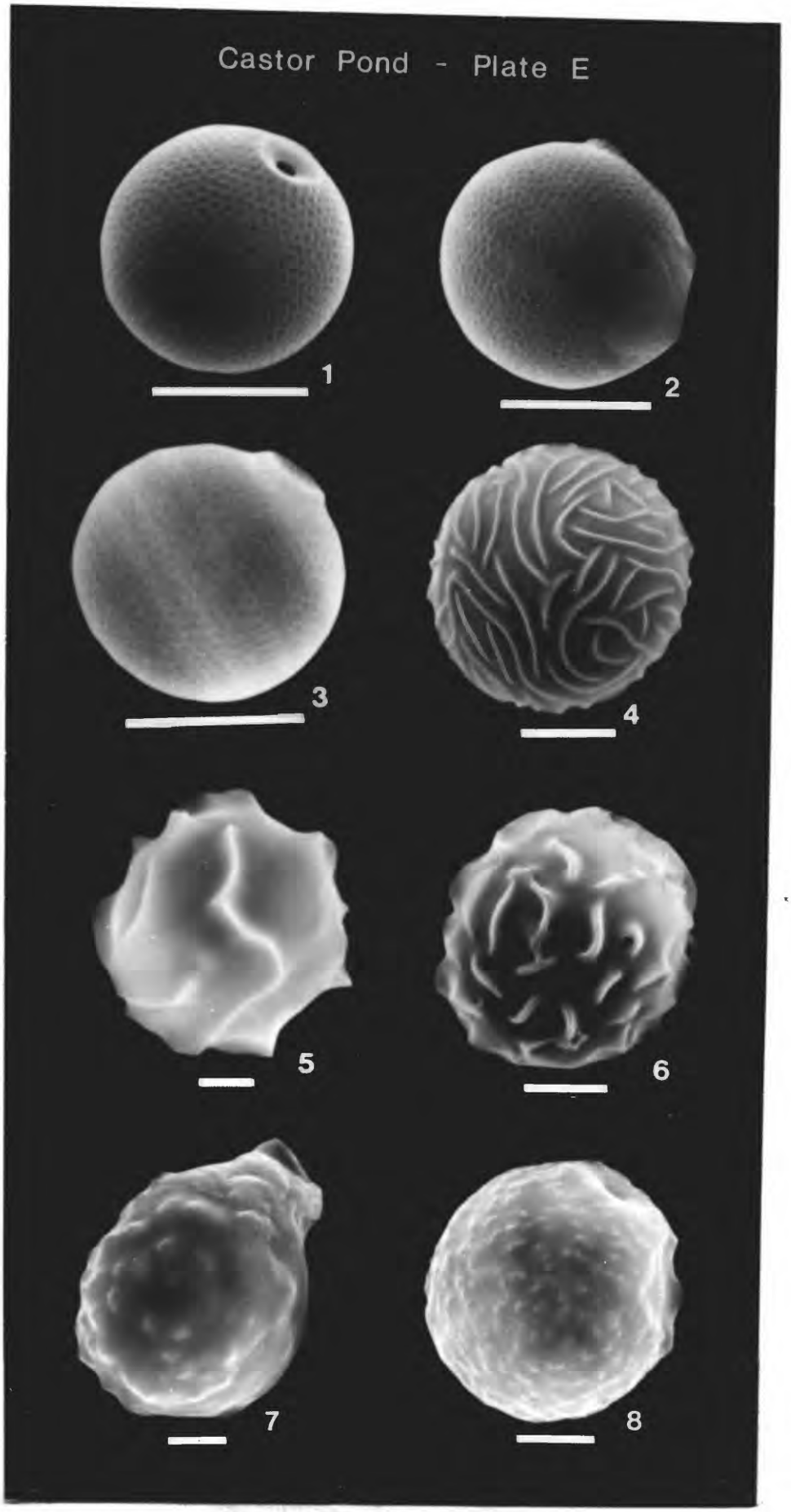
6 - Type 18

(aperture not visible; note small pores that appear to pass through cyst wall)

7 - Type 210

8 - Type 211

Castor Pond - Plate E



APPENDIX A

PREVIOUS REPORTS IN THIS SERIES

Mahood, Albert D., and Adam, David P., 1979a, Late Pleistocene chrysomonad cysts from core 7, Clear Lake, Lake County, California: U. S. Geological Survey Open-file Report Number 79-971, 11 p., 4 plates. Defines types 1 through 44.

Adam, David P., and Mahood, Albert D., 1979a, A preliminary annotated bibliography on siliceous algal cysts and scales: U. S. Geological Survey Open-file Report Number 79-1215, 34 p.

Mahood, Albert D., and Adam, David P., 1979b, Techniques used for the cleaning, concentration, and observation of chrysomonad cysts from sediments: U. S. Geological Survey Open-file Report Number 79-1431, 5 p.

Adam, David P., and Mahood, Albert D., 1979b, Chrysomonad cysts from Upper Echo Lake, Eldorado County, California: U. S. Geological Survey Open-file Report Number 79-1461, 21 p. + 12 plates.

Adam, David P., and Mehringer, Peter J., Jr., 1980, Modern and Holocene chrysomonad cysts from Lost Trail Pass Bog, Montana: U. S. Geological Survey Open-file Report Number 80-797, 13 p. + 5 plates.

Adam, David P., and Mahood, Albert D., 1980, Modern chrysomonad cysts from Fallen Leaf Lake, Eldorado County, California: U. S. Geological Survey Open-file Report Number 80-798, 9 p. + 2 plates.

Adam, David P., and Mahood, Albert D., 1980, Modern chrysomonad cysts from Alta Morris Lake, Eldorado County, California: U. S. Geological Survey Open-file Report Number 80-822, 11 p. + 4 plates.