Variation in Oospores of Six Species of Chara
Author(s): Dana G. Griffin III
Source: *Bulletin of the Torrey Botanical Club*, Vol. 90, No. 6 (Nov. - Dec., 1963), pp. 400-402
Published by: Torrey Botanical Society
Stable URL: https://www.jstor.org/stable/2482613

BULLETIN OF THE TORREY BOTANICAL CLUB

VOL. 90, No. 6, pp. 400–402 NOVEMBER–DECEMBER, 1963

Whitford, L. A. 1960a. Ecological distribution of fresh-water algae. *In,* The ecology of algae, Spec. Publ. 2, Pymatuning Lab. Field Biol., Pp. 2–10.

———. 1960b. The current effect and growth of fresh-water algae. Trans. Amer. Microscop. Soc., **79**: 302–309.

———., and **G. J. Schumacher.** 1961. Effect of current on mineral uptake and respiration by a fresh-water alga. Limnol. Oceanogr. **6**: 423–425.

Yoshida, T. 1959. Life cycle of a species of *Batrachospermum* found in northern Kyushu, Japan. Japan. Jour. Bot., **17**: 2–42.

Variation in oospores of six species of *Chara*

Dana G. Griffin III[1]

University of Tennessee, Knoxville

GRIFFIN, DANA G. III (University of Tennessee, Knoxville, Tennessee). *Variation in oospores of six species of* **Chara**. Bull. Torrey Bot. Club **90**: 400–402. Analysis of 3200 oospores taken from clonal cultures of six species of *Chara* how that under different cultural condition oospores from the same genetic stock may vary widely in length/width ratio. A re-evaluation of oospore size, especially as it applies to the differentiation of infraspecific categories, is advised.

The Charophyta has been a taxonomically difficult group, both in regard to individual species and in regard to its relation to other algal groups.

With the advent of unialgal and clonal culturing of these plants, it has become possible to study variation in morphological as well as other characters, using material of known genetic constancy.

Methods and materials. In the present experiment, series of clonal cultures of six species of *Chara* were grown in different soil-water and light-temperature regimes. A harvest of one-hundred oospores was taken from each. Several oospores were placed in a Sedswick-Rafter counting chamber and measurements made to the nearest three microns with a Whipple eyepiece micrometer. Both length and width were measured and a length/width ratio calculated.

Four different cultural conditions were used; however no serious attempt was made to ascertain differences in nutrients, pH, or other chemical factors to which the plants were exposed. The principal objective was to analyze what variation *did* occur and to reach some conclusion as to the taxonomic value of oospore measurements, particularly at the infraspecific levels. To allow for comparison, portions from the same clone were used in inoculating any one set of four cultures.

In Table I these cultures are designated I, II, III, and IV. A brief description of each follows. It should be re-emphasized that only the grosser factors were quantitized and that this is not a definitive statement of cul-

1 Received for publication June 10, 1963.

Based on work done at Texas Technological College, Lubbock, Texas.

tural conditions. I) Unialgal; horticultural soil and tap water; temperature constant 23°C. ± 2°C.; 18-6 light-dark cycle, 200–300 foot candles. II) Mixed culture; horticultural soil and tap water plus a small amount of calcium carbonate; temperature 23–35°C., fluctuating; light, daylight, fluctuating. III) Unialgal; horticultural soil and tap water plus a small amount of peat; temperature 23–35°C., fluctuating; light, daylight, fluctuating. IV) Unialgal; washed sand and tap water; temperature 23–35°C., fluctuating; light, daylight, fluctuating.

Table I. *Analysis of oospore variation in six species of* **Chara.** *N-100 for each variation range. L/W = range of length/width ratios; M. = mean ratio; S.D. = standard deviation.*

Species		I	II	III	IV
Chara braunii 301	L/W	1.57–2.49	1.72–2.39	1.52–2.34	—
Garza Co., Texas	M.	1.85	2.01	1.73	—
	S.D.	.145	.083	.133	—
C. contraria 310	L/W	1.91–2.80	1.63–2.26	1.59–2.44	—
Taos Co., N. Mex.	M.	2.18	1.88	1.88	—
	S.D.	.133	.078	.128	—
C. contraria 322	L/W	1.26–1.68	1.34–1.70	1.29–2.02	1.13–1.75
Presidio Co., Tex.	M.	1.45	1.52	1.57	1.45
	S.D.	.052	.048	.104	.074
C. contraria X-035	L/W	1.53–2.23	1.30–2.04	1.40–2.89	1.45–2.28
Trinidad, Bolivia	M.	1.81	1.58	1.95	1.68
	S.D.	.094	.091	.211	.127
C. evoluta 82	L/W	—	1.75–2.57	1.74–2.97	1.78–2.72
Torrance Co., N. Mex.	M.	—	2.15	2.44	2.14
	S.D.	—	.101	.157	.129
C. hydropitys 341	L/W	1.54–1.89	1.39–2.03	1.46–2.00	1.41–1.97
Garza Co., Texas	M.	1.68	1.67	1.78	1.65
	S.D.	.046	.084	.074	.074
C. hydropitys X-014	L/W	1.30–1.60	1.34–1.82	1.32–1.58	1.26–1.61
Chiapas, Mexico	M.	1.44	1.50	1.43	1.41
	S.D.	.037	.071	.028	.045
C. zeylanica 256	L/W	1.74–2.76	1.67–3.17	1.61–2.46	1.59–2.48
Kingfisher Co., Oklahoma	M.	2.03	2.18	2.01	1.90
	S.D.	.163	.219	.112	.124
C. sejuncta X-002	L/W	—	1.14–1.68	1.15–1.67	1.12–1.58
Meade Co., Kty.	M.	—	1.45	1.44	1.34
	S.D.	—	.073	.061	.083

Results and conclusions. (See Table I). The length/width ratio character in the oospore of *Chara* appears to describe a normal distribution in its variation. Analysis of 3200 oospores from six species of *Chara* grown in clonal culture shows that variation in this character exceeds what has previously been suspected. Differences in means, as indicated by "t" test values (not included here, but available upon request), range from marginal to high significance at 95% level of probability. In this experiment variation in the size and shape of the oospore was not seen to be correlated with any of the grosser physical factors such as light or temperature; however some species (*C· braunii* Gm. and *C. zeylanica* Klein ex Willd.)

BULLETIN OF THE TORREY BOTANICAL CLUB

VOL. 90, No. 6, pp. 402–407 NOVEMBER–DECEMBER, 1963

regularly exhibited more variation than others (*C. contraria* Braun ex Kutz. and *C. hydropitys* Reich.)

Though the experiment reported on here is preliminary in nature, it is apparent that the great extent of variation in the oospore of *Chara* requires that workers in the field make a re-evaluation of this character insofar as its usefulness is concerned, especially at those taxonomic levels where it is evidently of greater importance. Some authors have chosen to use oospore measurements in the complete or partial differentiation of "varieties" or "forms" of several species of *Chara* (Daily, 1953; Horn af Rantzien, 1950; Sundaralingam, 1959). In the work presented here, it has been shown that the confidence placed in oospore shape and size as a character to be used at the infraspecific levels is probably unjustified.

Literature Cited

Daily, Fay Kenoyer. 1953. The Characeae of Indiana. Butler Univ. Bot. St. **11**: 5–49.

Horn af Rantzien, H. 1950. Charophyta reported from Latin America. Arkiv. för Botanik. II. 1(8): 355–411.

Sundaralingam, V. S. 1959. A systematic account of South Indian Characeae. Proc. Indian Acad. Sci. **49**(1) Sec. B. 7–51.

Effect of various carbon sources on the development of *Erysiphe cichoracearum* on epidermal strips of *Lactuca sativa*[1]

W. C. Schnathorst

USDA, ARS, University of California, Davis

SCHNATHORST, W. C. (USDA, ARS, University of California, Davis). *Effect of various carbon sources on the development of* **Erysiphe cichoracearum** *on epidermal strips of* **Lactuca sativa.** Bull. Torrey Bot. Club **90**: 402–407, 1963. Sugars that supported the best growth of *Erysiphe cichoracearum* on epidermal strippings from lettuce leaves were D-fructose, D-glucose, D-mannose, and sucrose. L-sorbose was inhibitory. The cyclic hexahydric alcohol, i-inositol, was stimulatory whereas the straight-chain hexahydric alcohols, D-mannitol and D-sorbitol, were inhibitory. Mildew growth was completely inhibited when the initial molar ratio of D-mannitol to D-glucose was about 2:1 but inhibition was reversed when the ratio of these substances was reversed. The results suggest that D-mannitol, D-sorbitol, and L-sorbose support poor mildew growth because they inhibit some metabolic step in the host and/or pathogen rather than act solely as poorly utilized substrates.

Trelease and Trelease (1929) reported that of several sugars tested D-glucose, D-fructose, sucrose, and melizitose, supported the best growth of powdery mildew on detached wheat leaves. Lilly and Barnett (1953), Sempio (1950), and Trelease and Trelease (1929) found that L-sorbose and D-man-

[1] Received for publication June 10, 1963.