# A CONTRIBUTION TO THE DESMID FLORA OF NEW HAMPSHIRE. 

Joseph A. Cushman.
(Continued from page 119.)
Euastrum Ehrenb.
E. crassum (Bréb.) Kütz. (E. magnificum, var. crassioides Hast.) Length ${ }^{1} 55^{-1} 76 \mu$ : breadth $78-90 \mu$ : isthmus $25-28 \mu$ : breadth of polar lobe $4^{2-61} \mu$. North Woodstock! Pudding Pond, North Conway! Rochester (Hastings).

* Var. pulchrum var. nov. (Plate 64, fig. 1). Variety with four small central granules and an abundance of smaller granules arranged as in the figure, in form more like the typical form than like var. scrobiculatum. Length $155 \mu$ : breadth $75 \mu$ : isthmus $25 \mu$ : breadth of polar lobe $46 \mu$. Pudding Pond, North Conway! (Herbarium Cushman no. ir 8).

Var. ornatum (Wood) Hansg. (E. ornatum Wood.) Length $175 \mu$ : breadth $95 \mu$ : isthmus $25 \mu$ : breadth of polar lobes $56 \mu$. Pudding Pond, North Conway, frequent! Saco Lake (Wood).
E. multilobatum Wood. Length $13 \circ \mu$ : breadth $65 \mu$ : isthmus i8 $\mu$ : breadth of polar lobe $2 \mathrm{I} \mu$. Intervale! Pudding Pond, North Conway! Saco Lake (Wood).
E. pinnatum Ralfs. Length $133 \mu$ : breadth $72 \mu$ : isthmus 17 $\mu$ : breadth of polar lobe $35 \mu$. North Woodstock, common!

* E. Cuneatum Jenner. Length $102-140 \mu$ : breadth 59-62 $\mu$ : isthmus ${ }_{1} 4^{-\mathrm{I}} 5 \mu$ : breadth of polar lobe $28-33 \mu$. Mt. Moosilauke !
* Var. granulatum var. nov. Variety with the surface covered with fairly large granules. North Woodstock!
E. Wollei Lagerh. Length $170 \mu$ : breadth $108 \mu$ : isthmus $21 \mu$ : breadth of polar lobe $60 \mu$. Surface granular. Pudding Pond, North Conway!
E. ansatum Ehrenb. (E. Ralfsii Wood.) White Mountains, (Wcod).

[^0]E. didelta (Turp.) Ralfs. Length $98-15^{2} \mu$ : breadth $56-75 \mu$ : isthmus ${ }^{15} 5^{-19} \mu$ : breadth of polar lobe $20-31 \mu$. Intervale! Pudding Pond, North Conway!
E. ampullaceum Ralfs. Length $90-100 \mu$ : breadth $56-59 \mu$ : isthmus ${ }^{1} 3^{-1} 7 \mu$ : breadth of polar lobe $23^{-25} \mu$. Pudding Pond, North Conway, frequent!

* Forma scrobiculatum Nordst. Noone's Station! (H. C. no. 392).
E. verrucosum Ehrenb., var. reductum Nordst. Length $78 \mu$ : breadth $65 \mu$ : isthmus $16.5 \mu$ : breadth of polar lobe, $32 \mu$. North Woodstock! (H. C. no. 187).
E. circulare Hass. Length $65 \mu$ : breadth $43 \mu$ : isthmus $12.5 \mu$ : breadth of polar lobe $19 \mu$. Intervale !

Var. Ralfsii Wood. Saco Lake (Wood).
E. gemmatum (Bréb.) Ralfs. Length $40 \mu$ : breadth 3 I $\mu$ : isthmus $8 \mu$ : breadth of polar lobe $15 \mu$. Intervale. Meredith (Herbarium Johnson no. 369). Plymouth and Laconia (Wests).
E. Hastingsii Wolle. Cocheco River (Wolle).
E. binale (Turp.) Ehrenb., var. elobatum Lund. Length $25 \mu$ : breadth $18.5^{-20} \mu$ : isthmus $4.5-5 \mu$ : breadth of polar lobe io $\mu$. North Woodstock (H. C. no. 186) ! Pudding Pond, North Conway!

* Var. insulare (Roy) Wittr. Length $28 \mu$ : breadth $19 \mu$ : isthmus $5 \mu$. Mt. Moosilauke (H. C. no. 8o)!
E. elegans (Bréb.) Kütz. White Mountains (Wood).
E. inerme Lund. Length $50-65 \mu$ : breadth $34-42 \mu$ : breadth of polar lobe $10-12 \mu$. Intervale! Noone's Station!
E. denticulatum (Kirch.) Gay. Length $37 \mu$ : breadth $27 \mu$ : isthmus $6.4 \mu$ : breadth of polar lobe $20 \mu$. Pudding Pond, North Conway (H. C. no. 123)!
* E. pyramidatum West. Length $23 \mu$ : breadth $19 \mu$ : isthmus $5 \mu$ : breadth of polar lobe $14 \mu$. Pudding Pond, North Conway! (H. C. no. 123). The American specimens do not differ materially from the British ones.
E. evolutum (Nordst.) W. \& G. S. West. var. integrius W. \& G. S. West (E. spinosum Wolle). Length $53-59 \mu$ : breadth 35-36 $\mu$ : isthmus 8.5-9.5 $\mu$ : breadth of polar lobe $28-3$ I $\mu$. Pudding Pond, North Conway! Intervale!
* E. papilio Racib. ? Length $56 \mu$ : breadth $37 \mu$ : isthmus io $\mu$ :
breadth of polar lobe $26 \mu$. North Woodstock (H. C. no. 190)! A. single semi-cell was all that was seen of this species and it is therefore referred here with somewhat of a question. The finding of more material may show it to be a new species.
* E. Ciastonii Racib. Length $44 \mu$ : breadth $26 \mu$ : isthmus 5.5 $\mu$ : breadth of polar lobe $20 \mu$. Noone's Station (H. C. no. 394)! This species has been reported from Florida by the Wests.
E. FISSUM W. \& G. S. West. var. *Americanum var. nov. (Plate 64, fig. 2). Length $44 \mu$ : breadth $25 \mu$ : isthmus $4 \cdot 5^{-6} \mu$. Variety differing considerably in ornamentation from the typical having a rounded granule at each side of the polar incision, a ring of eight granules about the base of protuberance of each semi-cell and with double instead of single granulations at the base. Pudding Pond, North Conway (H. C. no. 129)! The species is new to U. S. having been described from Ceylon.


## Micrasterias Ag.

M. Torreyi Bail. Length $215 \mu$ : breadth $310 \mu$ : breadth of polar lobe $9 \circ \mu$ : isthmus $35 \mu$. Pudding Pond, North Conway, rare ! Surface slightly roughened with minute granules.
M. radiosa Ag. Length $15^{8} \mu$ : breadth $148 \mu$ : isthmus $21 \mu$ : breadth of polar lobe $36 \mu$. Pudding Pond, North Conway !

Var. Swainei (Hastings) W. \& G. S. West. Rochester (Wolle).
M. rotata (Grev.) Ralfs. Length $242 \mu$ : breadth $226 \mu$ : isthmus $27 \mu$ : breadth of polar lobe $57 \mu$. Pudding Pond, North Conway!
M. denticulata Bréb. Length $280-3 \mathrm{io} \mu$ : breadth $240-300 \mu$ : isthmus $30-42 \mu$ : breadth of polar lobe $65-76 \mu$. Intervale! North Woodstock! Pudding Pond, North Conway! Hanover (Edzuards).
M. fimbriata Ralfs. Rochester (Wolle).
M. furcata Ag. Length ${ }^{1} 5^{-1} 86 \mu$ : breadth $124^{-1} 50 \mu$ : isthmus $22-23 \mu$ : breadth of polar lobe $62-94 \mu$. Noone's Station, frequent!

* Var. simplex Wolle. Length $190 \mu$ : breadth $186 \mu$ : isthmus ı 8 . Pudding Pond, North Conway! Although it has been conclusively shown that this variety grades into the typical form, it is noteworthy that in this particular instance, the two forms were distinct in the localities given, and no traces of the other form seen in either case.
M. ringens Bail., var. serratula Wolle. Laconia (Wests, H. J. nos. 650,679 )!
M. Americana (Ehrenb.) Ralfs. Length $140 \mu$ : breadth $125 \mu$ : isthmus $28 \mu$ : breadth of polar lobe $77 \mu$. North Woodstock!

Var. recta Wolle. Length $143 \mu$ : breadth $121 \mu$ : isthmus $28 \mu$ : breadth of polar lobe $65 \mu$. North Woodstock (H. C. no. 179). Although this is of about the same size as the typical form the whole character of the end lobe is quite different.
M. Mahabuleshwarensis Hobson. Meredith, rare (Johnson).
M. Nordstedtiana Wolle. Breadth $170 \mu$. Meredith, rare (Johnson).
M. crenata Bréb. Hanover (Edzuards).
M. truncata (Corda) Bréb. Length $77-118 \mu$ : breadth $82-105$ $\mu$ : isthmus $21-24 \mu$ : breadth of polar lobe $60-78 \mu$. Intervale ! Pudding Pond, North Conway!
M. Laticeps Nordst., forma major Nordst. Length $150 \mu$ : breadth $198 \mu$ : isthmus $31 \mu$. Pudding Pond, North Conway, rare !
M. pinnatifida (Kütz.) Ralfs. Length $56-65 \mu$ : breadth $68-$ $72 \mu$ : isthmus $9.5 \mu$ : breadth of polar lobe $50 \mu$. Intervale! Pudding Pond, North Conway !
M. depauperata Nordst., var. Wollei Cushman. Length $140 \mu$ : breadth ${ }_{130} \mu$ : isthmus $25 \mu$ : breadth of polar lobe $90 \mu$. Pudding Pond, North Conway, rare !
M. foliacea Bail. Length $80-96 \mu$ : breadth $80-85 \mu$ : isthmus 14. $5^{-15 \mu}$ : breadth of polar lobe $36-38 \mu$. Pudding Pond, North Conway, rare! Laconia, rather scarce in a pond on a stream flowing from Lake Winnepesauke (Wests, H. J. no. 665)!
M. muricata Bail. Length $160-180 \mu$ : breadth $120-140 \mu$ : isthmus $21-22 \mu$ : breadth of polar lobe $120-140 \mu$. Pudding Pond, North Conway, rare !

* Forma minor forma nov. Length ${ }_{12} 2 \mu$ : breadth $84 \mu$ : isthmus $16 \mu$ : breadth of polar lobe $84 \mu$. Intervale !

> Cosmarium (Corda) Lund.
C. connatum Bréb. (Calocylindrus connatus Wolle, '92). Length $53-56 \mu$ : breadth $40-45 \mu$ : isthmus $37-42 \mu$. Pudding Pond, North Conway! Intervale!
C. pseudoconnatum Nordst. (Calocylindrus pseudoconnatus

Wolle, '92). Length $32 \mu$ : breadth $22 \mu$ : isthmus $20 \mu$. Intervale, frequent!

* C. Thwaitesir Ralfs. (Calocylindrus Thwaitesii Wolle, '92). Length ${ }^{1} 33 \mu$ : breadth $50 \mu$ : isthmus $40 \mu$. North Woodstock (H. C. no. 183)!
C. moniliforme (Turp.) Ralfs., forma elongata W. \& G. S. West. Length 4 I $\mu$ : breadth if $\mu$ : isthmus $7 \mu$. Laconia (H. J. no. 658).
C. viride (Corda) Josh. Length $48-49 \mu$ : breadth $25-26 \mu$ : isthmus $20 \mu$. Holderness (Wests).
C. Globosum Bulnh., var.* subarctoum Lagerh. Length $13.5 \mu$ : breadth if $\mu$ : isthmus $8 \mu$. Pudding Pond, North Conway (H. C. no. 129) ! Variety new to the U. S.
C. Contractum Kirch. Length $56 \mu$ : breadth $40 \mu$ : isthmus $12.5 \mu$. North Woodstock!
* C. obliquum Nordst., var. trigonum West. (Plate 64, fig. 4). Length $25 \mu$ : breadth i9 $\mu$ : isthmus io $\mu$. Mt. Moosilauke (H. C. no. 78)! Variety new to U.S.
C. Baileyi Wolle. Length $40 \mu$ : breadth $45 \mu$ : isthmus ${ }^{5} 5 \mu$. Squam Lake !
C. Regnesil Reinsch. Length i2 $\mu$ : breadth $12 \mu$ : isthmus $5 \mu$ : thickness $5 \mu$. Laconia (Wests).
C. exiguum Arch., forma * major Nordst. Length $37 \mu$ : breadth $25 \mu$ : isthmus $5 \mu$. Pudding Pond, North Conway! The typical form was reported by Wolle from Florida, the variety is new to U.S.
C. nitidulum DeNot. Length $28 \mu$ : breadth $25 \mu$ : isthmus $6 \mu$. Pudding Pond, North Conway!
C. pyramidatum Bréb. Length 78 -100 $\mu$ : breadth $5^{2-59 ~} \mu$ : isthmus $9_{-1} 8 \mu$. North Woodstock! Noone's Station!
C. pSeudopyramidatum Lund. Length $56 \mu$ : breadth $40 \mu$ : isthmus in $\mu$. Intervale!
* C. claviferum sp. nov. (Plate 64 , fig. 3). C. of medium size nearly twice as long as wide, surface punctate, the side of each semicell with ten scattered granules arranged as in the figure; at the end are four granules arranged in a diamond form, below near the base are four more granules in a curve the two outer ones being larger than the inner two, at each side of the semi-cell are two other granules : ends of the semi-cells thickened, median region at the isthmus depressed. Length $44 \mu$ : breadth $26 \mu$ : isthmus $8.5 \mu$. Pudding Pond, North Conway!
C. pachydermum Lund., forma * minor Nordst. Length $73 \mu$ : breadth $45 \mu$ : isthmus $18.5 \mu$. Pudding Pond, North Conway!
C. perforatum Lund. Length $61 \mu$ ! breadth $57 \mu$ : isthmus $34 \mu$. Plymouth and Laconia (Wests).
C. Capense DeToni. Length $76 \mu$ : breadth $68-75 \mu$ : isthmus $36 \mu$ : Pudding Pond, North Conway !
C. taxichondrum Lund., forma bidentulum Lagerh. Length, $40-42 \mu$ : breadth $40-46 \mu$ : isthmus $12-13 \mu$. Pudding Pond, North Conway! Intervale! Noone's Station!
C. subnudiceps W. \& G. S. West. Length $44 \mu$ : breadth $34 \mu$ : isthmus 8 : thickness $16 \mu$. Laconia (Wests).
C. cosmetum W. \& G. S. West. Length $53 \mu$ : breadth $43 \mu$ : isthmus $13 \mu$ : thickness $28 \mu$. Laconia (Wests, H. J. no. 672)!
C. quinarium Lund. Length $38-40 \mu$ : breadth $34-37 \mu$ : isthmus 8 -1o $\mu$. Pudding Pond, North Conway! Intervale! Mt. Moosilauke!
C. triplicatum Wolle. Length $53 \mu$ : breadth $39 \mu$ : isthmus $12.4 \mu$. Holderness (H. J. no. 375)! and Plymouth (Wests).
C. polymorphum Nordst. Length $40 \mu$ : breadth $3 \mathrm{I} \mu$ : isthmus $7 \mu$. Intervale !
C. Raciborskii Lagerh. Length $44-48 \mu$ : breadth $5^{\circ}-53 \mu$ : isthmus 20-2I $\mu$. Meredith, very rare (Johnson): Laconia, occasional (Wests).
C. Boeckil Wille. Length $28 \mu$ : breadth 30 : isthmus $7 \mu$. Squam Lake!
C. tetropthalmun (Kütz) Menegh. Length $57-8 \mathrm{I} \mu$ : breadth 53-60 $\mu$ : isthmus $14-22 \mu$. Intervale! Pudding Pond, North Conway, common!
C. margaritatum (Lund.) Roy \& Biss. Length $90 \mu$ : breadth $72 \mu$. Meredith, rare (Johnson).
C. pseudoorbiculare Cushman. Length $29-32 \mu$ : breadth $2 \mathrm{I}-$ $24 \mu$ : isthmus $8 \mu$. Intervale! Squam Lake!
C. intermedium Delp. Length $62 \mu$ : breadth $53 \mu$ : isthmus $21 \mu$ : thickness $33 \mu$. North Woodstock!
${ }^{*}$ C. Favum W. \& G. S. West. Length $70 \mu$ : breadth $60 \mu$ : isthmus 2 I $\mu$. Pudding Pond, North Conway! Slightly larger than the measurements of the type. As this species was described simply as North American this is its first definitely recorded locality.
C. Dentatum Wolle. Length $125 \mu$ : breadth $102 \mu$ : isthmus $25 \mu$. Squam Lake!
C. Latum Bréb. Meredith (Wests).
C. reniforme Arch., var. Compressum Nordst. Length $55 \mu$ : breadth $53 \mu$ : isthmus $17 \mu$ : thickness $27 \mu$. Laconia (Wests, H. J. no. 66i)!
C. octhodes Nordst. Length $69 \mu$ : breadth $56 \mu$ : isthmus $15 \mu$. Intervale!
* C. quadrum Lund., forma Johnsoni forma nov. (C. quadrum Lund, forma. Johnson, Bull. Torr. Bot. Club., v. 22, 1895 (July) p. 294, Pl. 240, f. 22). Length $44 \mu$ : breadth $40 \mu$ : isthmus $14 \mu$. Plymouth (H. J. no. 359).
* C. grandiforme Schmidle, var. Americana var. nov. (Plate 64 , fig. 5). Length $53 \mu$ : breadth $35 \mu$ : isthmus $18 \mu$. This variety is considerably smaller than the typical, in other points not varying greatly. Species new to U. S. Pudding Pond, North Conway!
C. suborbiculare Wood. (C. isthmochondrum Nordst.) Length, $31 \mu$ : breadth $28 \mu$ : isthmus $5 \mu$. Pudding Pond. North Conway! Saco Lake (Wool). As it seems certain that both of the above names represent a single species the older name of Wood should be retained.
C. cyclicum Lund. Meredith (Johnson).
C. amoenum Bréb., var. tumidum Wolle. Length $40-47 \mu$ : breadth 22-25 $\mu$ : isthmus $12 \mu$. Pudding Pond, North Conway! North Woodstock!
* C. homalodermum Nordst. Length $43 \mu$ : breadth $37 \mu$ : isthmus $7 \mu$. Intervale!
C. Phaseolus Bréb., var. elevatum Nordst. Length $4 \mathrm{I} \mu$ : breadth $25 \mu$ : isthmus $5 \mu$. Var. new to U. S. Pudding Pond, North Conway!
C. rectangulare Grun. Length $3^{8} \mu$ : breadth $3 \circ \mu$ : isthmus io $\mu$ : thickness i8 $\mu$. Laconia occasional (Wests).
C. pygmaeum Arch., var. Schliephackeanum (Bréb.) W. \& G. S. West. (C. Schliephackeanum Wolle, '92). Laconia occasional (Wests).
C. Sinostegos Schaarschm., var. obtusius Gutw. Length io $\mu$ : breadth $8 \mu$ : isthmus $3 \mu$ : thickness $4 \mu$. Laconia, occasional (Wests).
C. ornatum Ralfs. Length $26-32 \mu$ : breadth $27-34 \mu$ : isthmus $8-10 \mu$. Pudding Pond, North Conway! Intervale! Squam Lake! Noone's Station!
C. Eloiseanum Wolle. Length io5 $\mu$ : breadth $72 \mu$ : isthmus $34 \mu$. Laconia, scarce (Wests, H. J. no. 641)!
* Var. depressum W. \& G. S. West. Length $92 \mu$ : breadth without teeth $67 \mu$ : with teeth $75 \mu$ : isthmus $22 \mu$. A trifle larger than the measurements given by the authors. Pudding Pond, North Conway, frequent
C. caelatum Ralfs, var.* abnormale var. nov. (Plate 64, figs. 6 and 7). Length $38-4 \mathrm{I} \mu$ : breadth $37-38$ isthmus $\mathbf{1}^{1-14} \mu$ The ends of the semi-cells are broadly truncate with five protuberances or lobes along the border each of these with two papillæ: at the side of each semicell is a large broadly rounded lobe as is usually seen in the typical species. Occasionally in the material there were specimens which showed the connection with the typical, but these were few and the variety on the other hand was abundant. North Woodstock (H. C. no. 187)!
C. Blyttii Wille. Length $12 \mu$ : breadth $12 \mu$ : isthmus $3 \mu$. Squam Lake!
C. impressulum Elfv. Length $25 \mu$ : breadth $19 \mu$ : isthmus $3.5 \mu$. Pudding Pond, North Conway!
C. pseudopectinoides Wolle. White Mountains (Wolle).
C. dispersum Johnson. Length $40 \mu$ : breadth $40-44 \mu$ : isthmus II $\mu$ : thickness $20 \mu$. Meredith (Johnson).

Pleurotaeniopsis Lund.
P. cucumis (Corda) Lund. (Cosmarium cucumis Wolle, '92). Length $59-72 \mu$ : breadth $34-43 \mu$ : isthmus ${ }^{15-17} \mu$. Pudding Pond, North Conway, frequent! Saco Lake (Wood).
P. Debaryi (Arch.) Lund. (Calocylindrus DeBaryi Wolle '92). Length $75 \mu$ : breadth $37 \mu$ : isthmus $25 \mu$. Pudding Pond, North Conway!

* P. elegantissimum Lund. (Cosmarium elegantissimum Wolle '92), var. simplicius (W. \& G. S. West) n. comb. Length $47 \mu$ : breadth $22 \mu$ : isthmus 19 . Intervale (H. C. no. 159)! The type of the variety was from Florida.
P. ovale (Ralfs) Lund. (Cosmarium ovale Wolle '92), var. * Westii var. nov. The form mentioned by the Wests ('96) p. 249 as a common American form. It has a slightly subtruncate and
retuse apex, with the retuse portion without granules. Length ${ }_{5} 5^{-}$ $170 \mu$ : breadth $86-93 \mu$ : isthmus $30-36 \mu$. Pudding Pond, North Conway, scarce!


## Xanthidium Ehrenb.

X. armatum (Bréb.) Rab. North Woodstock!

Var. Cervicornis W. \&. G. S. West. Length with spines $166 \mu$ : without spines $\mathrm{I} 30 \mu$ : breadth wịth spines $\mathrm{I} 25 \mu$ : without spines 90 $\mu$ : isthmus $3 \mathrm{I} \mu$. Pudding Pond, North Conway! Saco Lake (Wood). There was no central group of granules as is frequently found in this species.
X. CRistatum Bréb. Length with spines $75^{\mu}$ : breadth with spines $50 \mu$ : isthmus $14 \mu$. Pudding Pond, North Conway! Noone's Station!

Var. uncinatum Bréb. Length with spines $80 \mu$ : without $59 \mu$ : breadth with spines $56 \mu$ : without $40 \mu$ : isthmus in $\mu$. Pudding Pond, North Conway!

* Forma angulatum West. Length with spines $72 \mu$, without 54 $\mu$ : breadth with spines $60 \mu$ : without $40 \mu$ : isthmus in $\mu$. No central protuberance present. Pudding Pond, North Conway!
X. antilopaeum (Bréb.) Kütz. Length with spines $105^{\mu}$, without $7 \mathrm{I} \mu$ : breadth with spines $102 \mu$, without $59 \mu$ : isthmus $16 \mu$. Pudding Pond, North Conway!

Var. polymazum Nordst. Length with spines $62-84 \mu$, without 46-68 $\mu$ : breadth with spines $5^{8-63 ~} \mu$, without $45^{-62 ~} \mu$ : isthmus 14-16 $\mu$. Pudding Pond, North Conway, frequent! Intervale! North Woodstock!

There is a considerable amount of variation even in this variety. Specimens from North Conway and Intervale have the long outwardly curved spines, and there are almost invariably but six granules in the chain. A considerably different form was met with from North Woodstock. This is like the specimen figured by L. N. Johnson under the variety Minneapoliense with the exception of the central spine. His specimen had the central spine above the chain of granules. That form was called var. Johnsoni by W. \& G. S. West in a later paper, although Johnson calls attention to the extreme variability of this form. The present form lacks the spine of Minneapoliense but has the median lateral spine as well marked as the two adjacent
ones. In this character the present specimen is exactly like that figured by Johnson. Nordstedt also figures this peculiarity in var. polymazum but it is in his specimens much less marked.

* Forma curvispinum forma nov. (Plate 64, fig. 11). Length with spines $93 \mu$ : without $56 \mu$ : breadth with spines $108 \mu$, without $50 \mu$ : isthmus ${ }^{1} 3.5 \mu$. Membrane punctate: the spines at the end start straight then curve outward making a decided angle. Pudding Pond, North Conway, common!
* Forma callosum forma nov. (Plate 64, fig. 12). Length with spines $84 \mu$, without $58 \mu$ : breadth with spines $74 \mu$, without $44 \mu$ : thickness $25 \mu$ : isthmus $13 \mu$. There is a thickened spot at the center of each semicell. Pudding Pond, North Conway, frequent !
X. Tylerianum West. ( $X$. antilopaeum, var. truncatum Wolle). Rochester, (Wolle, Hastings).
X. controversum W. \& G. S. West. Length with spines $55^{-59}$ $\mu$, without $36 \cdot 5-38 \mu$ : breadth with spines $5^{2-56} \mu$, without $31 \mu$ : isthmus 7.6-8 $\mu$ : thickness 20-21 $\mu$. Laconia (Wests).
* X. Bengalicum Turner. (Plate 64, fig. io). Length with spines $90 \mu$, without $68 \mu$ : breadth with spines $108 \mu$, without $62 \mu$ : isthmus $22 \mu$ : length of spines $20 \mu$. Near the upper end of each semicell is a row of ${ }^{15} \mathbf{5} \mathbf{2 0}$ small granules. Squam Lake! New to U. S.
* X. tetracentrotum Wolle. (Plate 64, figs. 8 \& 9.) Length $37 \mu$ : breadth with spines $53-57 \mu$, without $32-34 \mu$ : isthmus $9.5 \mu$. Intervale! Pudding Pond, North Conway! There is a great variation in the number and arrangement of the granules in this species. In the specimen from Intervale, fig. 9 , there are indications of two distal spines one on each semicell.


## Arthrodesmus Ehrenb.

A. convergens Ehrenb. Length $33-40 \mu$ : breadth with spines 45-50 $\mu$, without $34-35 \mu$ : isthmus $8 \mu$. Intervale!
A. Quadridens Wood. Length $35 \mu$ : breadth with spines $50 \mu$ : without $35 \mu$ : isthmus $8 \mu$. Pudding Pond, North Conway!
A. Incus (Bréb.) Hass. var. ${ }^{*}$ longispinus Eichl. \& Racib. Length with spines $42 \mu$, without $14 \mu$ : breadth with spines $38 \mu$, without $14 \mu$ : isthmus $6.5 \mu$ : length of spine $20 \mu$. Pudding Pond, North Conway !

* Var. validus W. \& G. S. West. Length with spines $68-7$ I $\mu$,
without $34-36 \mu$ : breadth with spines $75-77 \mu$, without $36-43 \mu$ : isthmus $7-8 \mu$ : length of spine $25^{-27} \mu$. Spines shorter than the typical form. Pudding Pond, North Conway!
*Var. Ralfsif W. \& G. S. West. Length $25 \mu$ : breadth with spines $59 \mu$, without $19 \mu$ : isthmus $6.2 \mu$. Pudding Pond, North Conway (H. C. no. 164)! Squam Lake!
A. octocornis Ehrenb. Length with spines $46 \mu$, without $14 \mu$ : breadth with spines $44 \mu$, without $22 \mu$ : isthmus $6 \mu$. Pudding Pond, North Conway !
* Forma minor Jacobs. Length with spines $21 \mu$, without $14 \mu$ : breadth with spines $18 \mu$ : isthmus $3 \mu$. Intervale! Var. new to U.S.
A. triangularis Lagerh., var. inflatus W. \& G. S. West. Length $38-40 \mu$ : breadth with spines $68-72 \mu$ : without $2 \mathrm{I}-25 \mu$ : isthmus 6.5-7 $\mu$. Pudding Pond, North Conway, frequent! Laconia (Wests, H. J. no. 659).


## Staurastrum Meyen.

S. anchora W. \& G. S. West. Length $76 \mu$ : breadth $140 \mu$. Laconia, (Wests, H. J. no. 657).
S. Arachne Ralfs. Length $4^{2} \mu$ : breadth with processes $52 \mu$ : isthmus $16 \mu$. Noone's Station! Saco Lake (Wood).
S. Arctiscon (Ehrenb.) Lund. (S. munitum Wood.) Length with processes ${ }^{50-1} 55 \mu$, without $7^{2-9} 6 \mu$ : breadth with spines $142-$ $160 \mu$, without $62-68 \mu$ : isthmus $3^{1-33 \mu}$. Wolle's figures of this species are not at all good. The figures of Wood are much more nearly correct. In their paper " On Some North American Desmidieae" (Trans. Linn. Soc. Lond. Ser. II. (Bot.) vol. v. pt. 5, p. 269) the Wests give the following: "All American examples we have seen of this species have shorter processes than the European ones, and they have at most but three rings of small teeth on each process." While this has been found true in Massachusetts specimens and some of those from New Hampshire it does not always hold true. The specimens from Pudding Pond, North Conway have long processes which are bifurcate at the apices as figured by Wood and have six or more rings of teeth on each process. Pudding Pond, North Conway! Squam Lake! Meredith, Holderness (Wests).

* S. arcuatum Nordst., forma aciculifera W. \&. G. S. West. Length with processes $26-27 \mu$, without $19 \mu$ : breadth with proc-
esses $32-48.5 \mu$, isthmus $7.5-9.5 \mu$. Intervale! This variety is described simply as North American by the authors so that this record is the first with a definite locality. The specimens are in every way like the type of the variety except for slight variations in measurements.
* S. botrophilum Wolle. Length $46-50 \mu$ : breadth $34-40 \mu$ : isthmus $9.5^{-1 \text { I }} \mu$. North Woodstock, common!
S. Brasiliense Nordst. Length with spines $133 \mu$, without $75 \mu$ : breadth with spines $120 \mu$, without $63 \mu$ : isthmus $33 \mu$. Pudding Pond, North Conway! One specimen was noted which was five armed in end view.
S. Cerastes Lund. Length $56 \mu$ : breadth with processes $46 \mu$ : isthmus ir $\mu$. Pudding Pond, North Conway (H. C. no. 122)! This agrees in every way with the original figures of Lundell.
* S. claviferum W. \& G. S. West. Length $36 \mu$ : breadth with processes $42 \mu$, without $34 \mu$ : isthmus $12 \mu$. Squam Lake! This again gives a definite locality for a species recorded simply as North American.
* S. concinnum W. \& G. S. West. (S. forficulatum Wolle '92.) Length $45 \mu$ : breadth $72 \mu$ : isthmus $12 \mu$. Intervale!
${ }^{*}$ S. cornigerum Roy \& Biss. Length $38 \mu$ : breadth with spines 41 $\mu$ : isthmus ro $\mu$. Pudding Pond, North Conway (H. C. no. I5 I) ! Intervale! New to U. S.
S. echinatum Bréb. Length $42 \mu$ : breadth $34 \mu$. Pudding Pond, North Conway !
S. forficulatum Lund., var. enoplon West. (S. crescentum Hastings) Dover (Wolle).
S. Gracile Ralfs. Breadth with processes $50-62 \mu$ : isthmus $10.5 \mu$. Pudding Pond, North Conway!
S. GRande Bulnh. Length $7 \circ \mu$ : breadth $65 \mu$ : isthmus $15 \mu$. Intervale! Meredith (Johnson).
S. Johnsonii W. \& G. S. West. Length $45^{-56} \mu$ : breadth with processes $82-\mathrm{IO} 2 \mu$ : breadth at base $14-18 \mu$ : isthmus $8-9 \mu$. Intervale, common! Meredith, Holderness, Laconia (Wests).
S. Laconiense W. \& G. S. West. Length 3 I $\mu$ : breadth with spines $48-53 \mu$ : without $38 \mu$ : isthmus $12 \mu$. Pudding Pond, North Conway! Laconia (Wests).
S. Leptacanthum Nordst. Length with processes $84 \mu$, without $34 \mu$ : breadth with processes $65 \mu$, without $22 \mu$ : isthmus in $\mu$. Pud-
ding Pond, North Conway! This was the typical form, that called by Lagerheim $6+4$ radiata.
S. leptocladum Nordst. Length with processes $74-80 \mu$, without $30 \mu$ : breadth with processes $96-112 \mu$ : isthmus in $\mu$. Pudding Pond, North Conway !
S. Lewisil Wood. Breadth with processes $62 \mu$ : without $34 \mu$ : isthmus $5.5^{-6} \mu$. Pudding Pond, North Conway (H. C. no. 136)! Saco Lake ( $W$ ood). This has the basal spines, the absence of which seems to be the only difference between it and $S$. aristiferum Ralfs. var. parallelum W. \&. G. S. West.
* S. longiradiatum W. \& G. S. West, forma major W. \&. G. S. West. Length with processes $62-68 \mu$, without 3 I $\mu$ : breadth with processes $80-9 \circ \mu$, isthmus ro $\mu$. Pudding Pond, North Conway (H. C. no. ${ }^{151}$ )! This had more curved processes than the specimen figured by the authors but was in essential points the same. It had the three spines at the end of the processes which is characteristic of the form. This again gives a definite locality for a species described simply as North American.
* S. longispinum (Bail.) Arch., var. bidentatum (Wittr.) n. comb. (Plate 64, fig. 13.) (S. bidentatum Wittr.) Length $103 \mu$ : breadth with spines ${ }^{12} 5^{-1} 55 \mu$, without $90-92 \mu$ : isthmus $33 \mu$ : length of spine $29 \mu$. Squam Lake! Pudding Pond, North Conway, occasional! The form with two spines at each angle and these short and fairly stout instead of long as in the typical.
* S. Lunatum Ralfs. Length with spines $40 \mu$, without $30 \mu$ : breadth with spines $40-44 \mu$, without $28-32 \mu$ : isthmus $6.5 \mu$. Pudding Pond, North Conway!
S. macrocerum Wolle. Length $5^{8} \mu$ : breadth with processes ${ }^{125-127} \mu$ : without $22-25 \mu$ : isthmus $15 \mu$. Pudding Pond, North Conway, frequent!
S. megacanthum Lund. Length $46 \mu$ : breadth with spines $83 \mu$. Pudding Pond, North Conway !
S. megalonotum Nordst. Length with spines $48 \mu$ : breadth with spines $40 \mu$ : isthmus $12.5 \mu$. Pudding Pond, North Conway (H. C. no. 131)!

Forma obtusum Hast. Rochester (Hastings).
*S. minutissimum Reinsch., var. constrictum West. Length 24 $\mu$ : breadth $24 \mu$ : isthmus $9 \mu$. Squam Lake !
S. muticum Bréb. Length $36 \mu$ : breadth $36 \mu$. Squam Lake !
S. Ophiura Lund., var. ${ }^{*}$ tetracerum Wolle. Length $60 \mu$ : breadth with processes $108 \mu$ : without $24 \mu$ : isthmus $15 \mu$. Pudding Pond, North Conway, frequent !
S. paradoxum Meyen. Breadth $45 \mu$. Squam Lake! Saco Lake (Wood).
S. pentacladum Wolle. Length $3^{8} \mu$ : breadth with processes 47-52 $\mu$ : without ${ }^{13-25 ~} \mu$ : isthmus 8-16 $\mu$. Intervale! Noone's Station!
${ }^{*}$ S. pulcherrimum sp. nov. (Plate 64, fig. 14). Length with spines $100 \mu$, without $8 \circ \mu$ : breadth with spines $78 \mu$, without $46 \mu$ : isthmus $15.5 \mu$. In front view semicells compressed spherical, in end view quadrangular with the sides tumid, each angle with two large spines confluent at the base, sides with four vertical rows of paired granules arranged in fours. Pudding Pond, North Conway (H. C. no. 131)!
S. saltans Josh., var. forcipigerum Lagerb. (Plate 64, fig. i5.) Length without spines $65 \mu$ : breadth with processes $118 \mu$ : breadth at base $12.5 \mu$ : isthmus $7 \mu$. Pudding Pond, North Conway, frequent!
S. spongiosum Bréb. Length with processes $65 \mu$, without $53 \mu$ : breadth with processes $53 \mu$ : isthmus $15 \mu$. Pudding Pond, North Conway (H. C. no. 129)!

* Var. depauperatum Racib. Length $41 \mu$ : breadth $28 \mu$ : isthmus $8 \mu$. Pudding Pond, North Conway (H. C. no. 129)!
S. striolatum Näg. Breadth $34 \mu$ : isthmus io $\mu$. North Woodstock!

Forma Brasiliense Turner. Length $25 \mu$ : breadth $22 \mu$ : isthmus $7 \mu$. Laconia (Wests, H. J. no. 676).
S. sublaevispinum Wests. Length $25 \mu$ : breadth $37 \mu$ : isthmus $7 \mu$. Laconia (Wests, H. J. no. 651)!

## Sphaerozosma Corda.

S. excavatum Ralfs, forma laevis Rab. Length $12-12.5 \mu$ : breadth of filament $12 \mu$ : isthmus $4.5 \mu$. Pudding Pond, North Conway, frequent!

Forma granulata Rab. (S. spinulosum Wolle,? '92). Length 9-10 $\mu$ : breadth of filament $9 \mu$ : isthmus $3.2 \mu$. Pudding Pond, North Conway! Intervale!

## Onychonema Wallich.

* O. Nordstedtiana Turner. Length $12.5 \mu$ : breadth $12.5 \mu$ : isthmus $3.5 \mu$ : thickness $6.4 \mu$. Filament twisted, from one face to the next face 24 cells, complete double turn 48 cells. Intervale!
O. laeve Nordst., var. micracanthum Nordst. Length $14 \mu$ : breadth with processes $2 \mathrm{I} \mu$, without $16 \mu$ : isthmus $3.5 \mu$. Intervale!

Spondylosium Bréb.
S. pulchrum (Bail.) Arch., var. inflatum (Wolle) W. \& G. S. West. (Sphaerozosma pulchrum, var. inflatum Wolle '92). Length $33 \mu$ : breadth of filament $65 \mu$ : isthmus io $\mu$. Pudding Pond, North Conway (H. C. no. 138)! Laconia (Wests, H. J. no. 667) !
S. moniliforme Lund. (Sphaerozosma moniliforme Wolle '92). Length $34 \mu$ : breadth $17 \mu$. Laconia (Wests, H. J. no. 68o)!

## Hyalotheca Ehrenb.

H. dissiliens (Smith) Bréb. Length $22 \mu$ : breadth of filament 25-28 $\mu$. Pudding Pond, North Conway! North Woodstock!
*Var. minor Delp. Length $12-15 \mu$ : breadth of filament $18-22 \mu$. Intervale !

## Desmidium Ag.

D. aptogonum Bréb. Length $12 \mu$ : breadth of filament $2 \mathrm{I}-34 \mu$ : isthmus $14 \mu$. Pudding Pond, North Conway, frequent! Intervale!
D. Baileyi (Ralfs) Nordst. Length $20-25 \mu$ : breadth of filament $2 \mathrm{I}-\mathbf{2 5} \mu$. Pudding Pond, North Conway! Intervale!
D. Swartzii Ag. Length $12 \mu$ : breadth of filament $37-43 \mu$. Pudding Pond, North Conway! Intervale!

* D. coarctatum Nordst. Length $28-40 \mu$ : breadth of filament, maximum $38-45 \mu$, minimum ${ }^{25-33} \mu$. Pudding Pond, North Conway, common!
D. Quadratum Nordst. Length $22 \mu$ : breadth of filament 36-40 $\mu$. Intervale! Noone's Station!
D. graciliceps (Nordst.) Lagerh. Pudding Pond, North Conway!
D. Cylindricum Grev. Maximum breadth $46 \mu$, minimum $31 \mu$. Pudding Pond, North Conway!


## Gymnozyga Ehrenb.

G. moniliformis Ehrenb. (Bambusina Brebissonii Wolle '92). Length 25-37 $\mu$ : maximum breadth 18-25 $\mu$, minimum 16-21 $\mu$. Pudding Pond, North Conway! Intervale!

Altogether in the two parts of the present paper there are reported two hundred and fifty-three species and varieties of Desmids. Hitherto there were but seventy-four reported from the State, so that one hundred and seventy-nine are new records for the State. A considerable number of the species or varieties were also new to the New England list. One thing is very noticeable and that is the confirmation of the fact that a granitic country or one with old geological rocks will give a much greater number of species than one of opposite character. In the collection from Pudding Pond, North Conway, in spite of the fact that but one collection was made at only one time of year there have been identified one hundred and twenty-six species and varieties, exactly one half of the whole number reported from all sources from the State. This number might be increased by a continued examination of the Pond at other seasons and at other parts. Altogether from the small amount of ground covered there is every indication that the State of New Hampshire will furnish a large part of the Desmids that will be reported from New England.

Boston Society of Natural History.

> Explanation of Plate 64. Figures $4,10-13, \times 400:$ all others $\times 550$

Figure 1. Euastrum crassum (Bréb.) Kütz., var. pulchrum var. nov.
" 2. Euastrum fissum W. \& G. S. West, var. Americanum var. nov.
" 3. Cosmarium claviferum sp. nov.
" 4. Cosmarium obliquum Nordst., var. trigonum West.
" 5. Cosmarium grandiforme Schmidle, var. Americanum var. nov.
" 6, 7. Cosmarium caelatum Ralfs, var. abnormale var. nov. Fig. 7 shows connection with the typical form of the species.
" 8, 9. Xanthidium tetracentrotum Wolle.
" 10. Xanthidium Bengalicum Turner.
" II. Xanthidium antilopaeum (Bréb.) Kütz., forma curvispinum forma nov.
" 12. Xanthidium antilopaeum (Bréb.) Kütz., forma callosum forma nov.
" 13. Staurastrum longispinum (Bail.) Arch., var. bidentatum (Wittr.).
" 14. Staurastrum pulcherrimum sp. nov.
" 15. Staurastrum saltans Josh., var. forcipigerum Lagerh.


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[^0]:    * As in the preceding part of this paper, starred forms are new to the New England Flora.

