ANATOMY OF NONCOSTAL PORTIONS OF LAMINA IN THE CYCLANTHACEAE (MONOCOTYLEDONEAE). V. TABLES OF DATA

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This is the last paper of a series which pertains to lamina anatomy in the Cyclanthaceae (Wilder, in press a, b, c, d). Each paper is based on the same fifty-three species and ten genera of the family. Collection localities have been listed (Tomlinson and Wilder, 1984). The present paper includes tables which document findings in all previous papers of the series. Tables are organized into four groups representing paper nos. *I-IV* of the series, respectively. Each group of tables is introduced by a synopsis of the paper which it represents.

INTRODUCTION TO TABLES 1-6 (Wilder, in press *a*)

The outer walls of ordinary epidermal cells exhibit inner non-cutinized and outer cutinized regions, and are covered by a cuticle *sensu stricto* (Table 1). Noncostal portions of cyclanthaceous laminae are always hypostomatic, i.e., having the majority of stomata situated in the abaxial epidermis (Tables 2, 3). In noncostal parts of this epidermis, stomata are oriented within stomatal bands, and such bands are separated by interstomatal bands of four main kinds: (1) in interridge areas, bands located over superficially situated fiber strands of the mesophyll, (2) also in interridge areas, bands situated over the largest longitudinal veins, (3) bands occurring on abaxial ridges, and (4) bands of epidermal expansion tissue. Given a small strip of epidermis, it is sometimes possible to ascertain the following: whether it is adaxial or abaxial; if abaxial, whether portions thereof are from interridge areas, ridges, or expansion tissue, and

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which portions from interridge areas occur over fiber strands and the largest veins; which are the abaxial and adaxial sides of the strip; which are its distal and basal ends, and its left and right sides relative to the lamina it came from. A cyclanthaceous stoma is normally encircled by four subsidiary cells, and the stoma and associated subsidiary cells are collectively called a stomatal complex (Tables 4–6). Subsidiary cells may differ from ordinary epidermal cells in numerous ways such as their shape and position, nature of inclusions, staining of outer cell walls, size of nuclei, and thickness and ornamentation of the cuticle. In four species the stomata exhibit polar perforations, i.e., large pores located within the distal and basal ends of the common wall between two associated guard cells. Cyclanthaceous stomata exhibit substantial dorsiventral symmetry.

TABLE 1.
GENERAL RANGE IN COMBINED THICKNESS OF CUTICLE AND CUTINIZED
REGION (rounded off to nearest quarter micrometer)

<i>Species</i>	<i>Adaxial epidermis</i>	<i>Abaxial epidermis</i>
<i>A. aff. A. antioquiae</i> (coll. A)	0.75– 1.5	0.5 – 2
<i>A. aff. A. antioquiae</i> (coll. B)	1 – 1.5	0.5 – 1
<i>A. cabreræ</i>	2 – 3.25	0.75– 2.5
<i>A. cayapensis</i>	1.5 – 2.5	0.5 – 2
<i>A. sp. nov. aff. A.</i> <i>cupulifera</i> (coll. A)	1 – 1.5	0.5 – 1
<i>A. sp. nov. aff. A.</i> <i>cupulifera</i> (coll. B)	3 – 4.75	1 – 3.75
<i>A. gamotepala</i>	3.25– 7.25	1.5 – 6.25
<i>A. hookeri</i>	0.75– 1.5	<0.5 – 0.75
<i>A. longitepala</i>	1.5 – 2.5	0.75– 1.5
<i>A. sp. nov. aff. A.</i> <i>longitepala</i>	2.5 – 5.25	1.5 – 4.25
<i>A. moritziana</i>	2 – 3.75	0.75– 3
<i>A. aff. A. moritzii</i>	3 – 4.25	1 – 2.5

TABLE 1 (*continued*)

GENERAL RANGE IN COMBINED THICKNESS OF CUTICLE AND CUTINIZED
REGION (rounded off to nearest quarter micrometer)

<i>Species</i>	<i>Adaxial epidermis</i>	<i>Abaxial epidermis</i>
<i>A. sp. nov. aff. A. multistaminata</i>	1 – 2.5	0.5 – 1.5
<i>A. peruviana</i>	1.5 – 4.75	0.5 – 2.5
<i>A. pycnantha</i>	2.5 – 4.5	1 – 3
<i>A. quinindensis</i>	1 – 2.5	0.5 – 1
<i>A. sp. nov. aff. A. rhodea</i>	1.5 – 2.5	0.5 – 2
<i>A. rigida</i>	1.5 – 3	0.5 – 1.25
<i>A. tetragona</i>	1.5 – 3.75	0.75– 1.5
<i>A. urophylla</i>	3 – 8.75	1.5 – 4.75
<i>A. aff. A. vaupesiana</i> (coll. A)	1.5 – 3.25	0.5 – 2
<i>A. aff. A. vaupesiana</i> (coll. B)	1.5 – 2.5	0.5 – 1.5
<i>A. (Asplundia)</i> sp. nov.	1 – 3	1 – 3.25
<i>Ca. palmata</i>	3.5 – 5.5	1 – 4
<i>Cy. bipartitus</i>	1 – 2	0.5 – 1.5
<i>D. crinitum</i>	1.5 – 3.5	1 – 2.5
<i>D. dolichostemon</i>	0.5 – 1.5	<0.5 – 1.5
<i>D. globosum</i>	1.5 – 2.5	1 – 3
<i>D. grandifolium</i>	0.5 – 1	0.5 – 2
<i>D. harlingii</i>	<0.5 – 0.5	<0.5 – 0.5
<i>D. macrophyllum</i>	1.5 – 5.75	0.75– 3.25
<i>D. mirabile</i>	0.75– 1.5	0.5 – 1.5
<i>D. sp. nov. aff. D. nanum</i>	1.5 – 3	1 – 2.5
<i>D. rheithrophilum</i>	1.5 – 3.75	1 – 3.75
<i>D. schultesii</i>	0.75– 2.5	0.5 – 3.25
<i>D. wallisii</i>	0.5	0.25– 0.5
<i>D. sp. nov. (coll. A)</i>		0.5 – 0.75
<i>D. sp. nov. (coll. B)</i>	0.5 – 1	0.5

TABLE 1 (*continued*)
GENERAL RANGE IN COMBINED THICKNESS OF CUTICLE AND CUTINIZED
REGION (rounded off to nearest quarter micrometer)

<i>Species</i>	<i>Adaxial epidermis</i>	<i>Abaxial epidermis</i>
<i>E. funifer</i>	2.0 – 3.5	1 – 3.5
<i>L. bierhorstii</i>	1 – 3	0.5 – 1
<i>L. integrifolia</i>	3.75– 6.75	2.5 – 5.25
<i>L. lancifolia</i>	3 – 5	2.5 – 5
<i>Sch. chorianthum</i>	1 – 1.5	<0.5 – 0.5
<i>Sph. acutitepala</i>	3 – 4.75	1 – 7.25
<i>Sph. crocea</i>	3.25– 7.75	1.5 – 4.75
<i>Sph. killipii</i>	5 – 7.5	0.5 – 3
<i>Sph. snidernii</i>	6.25–13	1 – 3.75
<i>Sph. woodsonii</i>	5.25– 7.25	0.5 – 1
<i>Sph. sp. nov. aff.</i> <i>Sph. woodsonii</i>	3 – 5.25	1.5 – 3.25
<i>Sph. sp. nov.</i>	3.25– 6.25	0.5 – 3
<i>St. anomala</i>	7.75–12	3.75–12
<i>St. stylaris</i>	8.5 –12.5	4 –10.5
<i>T. bissectus</i>	1 – 6.5	1 – 5

TABLE 2

CONCENTRATION OF STOMATA AND LAMINA THICKNESS IN INTERRIDGE AREAS.*

	No. of stomata/mm ² in the abaxial epidermis, adaxial epidermis, and both epidermides			Ratio of nos. of stomata/mm ² - abaxial:adaxial	Lamina thickness - general range and midpoint of range (mm)	Lamina thickness - in nos. of cell layers
<i>A. aff. A. antioquiae</i> (coll. A)	213	4.0	217	53	0.18-0.29; 0.24	11-13
<i>A. aff. A. antioquiae</i> (coll. B)	267	2.8	270	95	0.23-0.34; 0.29	12-15
<i>A. cabreræ</i>	108	13	121	8.4	0.41-0.52; 0.46	17-20
<i>A. cayapensis</i>	155	3.1	158	50	0.31-0.45; 0.38	19-22
<i>A. sp. nov. aff. A.</i> <i>cupulifera</i> (coll. A)	131	0.31	132	421	0.16-0.20; 0.18	10-15
<i>A. sp. nov. aff. A.</i> <i>cupulifera</i> (coll. B)	169	0.31	169	542	0.20-0.29; 0.24	13-15
<i>A. gamotepala</i>	260	9.0	269	29	0.35-0.44; 0.40	16-19
<i>A. hookeri</i>	117	3.1	120	38	0.22-0.29; 0.26**	10-12**
<i>A. longitepala</i>	138	2.5	140	55	0.25-0.36; 0.30	11-14
<i>A. sp. nov. aff. A.</i> <i>longitepala</i>	176	5.6	181	31	0.31-0.39; 0.35	15-18
<i>A. moritziana</i>	118	4.7	122	25	0.23-0.29; 0.26	12-16

TABLE 2 (*continued*)
CONCENTRATION OF STOMATA AND LAMINA THICKNESS IN INTERRIDGE AREAS.*

	No. of stomata/mm ² in the abaxial epidermis, adaxial epidermis, and both epidermides			Ratio of nos. of stomata/mm ² - abaxial:adaxial	Lamina thickness - general range and midpoint of range (mm)	Lamina thickness - in nos. of cell layers
<i>A. aff. A. moritziana</i>	269	1.2	270	216	0.20-0.26; 0.23	11-14
<i>A. sp. nov. aff. A. multistaminata</i>	144	12	156	12	0.21-0.27; 0.24	11-13
<i>A. peruviana</i>	167	8.3	175	20	0.21-0.27; 0.24	11-12
<i>A. pycnantha</i>	166	4.0	170	41	0.30-0.37; 0.33	16-20
<i>A. quinindensis</i>					0.19-0.26; 0.23	11-13
<i>A. sp. nov. aff. A. rhodea</i>	156	0.93	157	167	0.20-0.23; 0.22	11-12
<i>A. rigida</i>	132	5.6	138	24	0.28-0.37; 0.32	14-15
<i>A. tetragona</i>	140	5.6	145	25	0.19-0.24; 0.22	12-15
<i>A. urophylla</i>	207	8.1	215	26	0.24-0.32; 0.28	15-18**
<i>A. aff. A. vaupesiana</i> (coll. A)	188	11	199	17	0.23-0.29; 0.26**	12-15**
<i>A. aff. A. vaupesiana</i> (coll. B)	107	8.4	116	13	0.30-0.34; 0.32	13-15
<i>A. (Asplundia)</i> sp. nov.	104	3.4	107	30	0.32-0.41; 0.36	12-14

<i>Ca. palmata</i>	269	1.2	270	215	0.18–0.26; 0.22	12–16
<i>Cy. bipartitus</i>	311	41	352	7.6	0.26–0.41; 0.33	14–16
<i>D. crinitum</i>	234	0.93	235	250	0.34–0.43; 0.39	20–27
<i>D. dolichostemon</i>	142	29	170	4.9	0.23–0.31; 0.27	14–16
<i>D. globosum</i>	261	0	261	ca. ∞	0.32–0.37; 0.35	12–14**
<i>D. grandifolium</i>	107	30	138	3.6	0.19–0.26; 0.22	9–12
<i>D. harlingii</i>	108	46	154	2.3		
<i>D. macrophyllum</i>	255	0.31	255	818	0.34–0.45; 0.40	19–21
<i>D. mirabile</i>	165	62	228	2.7	0.23–0.32; 0.28	11–14
<i>D. sp. nov. aff. D. nanum</i>	270	26	296	10	0.27–0.33; 0.30	12–14**
<i>D. rheithrophilum</i>	189	19	208	10	0.41–0.48; 0.44	14–18
<i>D. schultesii</i>	151	28	179	5.4	0.19–0.24; 0.22	10–14
<i>D. wallisii</i>	273	22	295	12	0.25–0.28; 0.27	12–15**
<i>D. sp. nov. (coll. A)</i>	71	8.1	79	8.7	0.28–0.33; 0.30	9–11
<i>D. sp. nov. (coll. B)</i>	194	9.0	203	21	0.28–0.36; 0.32	14–16
<i>E. funifer</i>	160	14	174	11	0.17–0.24; 0.20	10–13
<i>L. bierhorstii</i>	59	2.5	61	24	0.26–0.32; 0.29**	10–12**
<i>L. integrifolia</i>	91	26	117	3.5	0.37–0.46; 0.42	12–15
<i>L. lancifolia</i>	44	34	78	1.3	0.47–0.61; 0.54	12–17
<i>Sch. chorianthum</i>	144	0	144	ca. ∞	0.12–0.16; 0.14	8–9

TABLE 2 (continued)

CONCENTRATION OF STOMATA AND LAMINA THICKNESS IN INTERRIDGE AREAS.*

	No. of stomata/mm ² in the abaxial epidermis, adaxial epidermis, and both epidermides			Ratio of nos. of stomata/mm ² - abaxial:adaxial	Lamina thickness - general range and midpoint of range (mm)	Lamina thickness - in nos. of cell layers
<i>Sph. acutitepala</i>	236	0	236	ca. ∞	0.32-0.38; 0.35	15-17
<i>Sph. crocea</i>	164	0.62	164	262	0.29-0.48; 0.39	16-18
<i>Sph. killipii</i>	309	5.6	315	55	0.33-0.38; 0.36	16-18
<i>Sph. snidernii</i>	273	10	283	27	0.28-0.36; 0.32	15-17
<i>Sph. woodsonii</i>	188	0	188	ca. ∞	0.36-0.42; 0.39	16-17
<i>Sph. sp. nov. aff.</i> <i>Sph. woodsonii</i>	123	3.7	127	33	0.40-0.45; 0.43	22
<i>Sph. sp. nov.</i>	486	1.9	488	260	0.23-0.32; 0.27	12-14
<i>St. anomala</i>	105	0	105	ca. ∞	0.30-0.41; 0.36**	13-17**
<i>St. stylaris</i>	176	1.9	178	94	0.47-0.61; 0.54	18-22
<i>T. bissectus</i>	227	80	307	2.8	0.33-0.43; 0.38	17-20

*Stomatal frequencies were determined by studying mostly stained, but also unstained epidermal peels with the phase microscope at 100X. Stomata were counted on 3.21 mm² of a peel from each of the abaxial and adaxial epidermides, with the following exceptions (the two figures between each pair of parentheses indicate areas studied [mm²] of the abaxial and adaxial epidermides, respectively): *A. peruviana* (1.81, 1.81), *A. urophylla* (3.01, 3.21), *D. harlingii* (2.01, 3.21), and *D. mirabile* (2.01, 1.61). As often as possible on a peel, fields were studied which were laterally rather than longitudinally adjacent to one another, to maximize randomness of sampling, i.e., to avoid including the same stomatal or interstomatal band(s) in all samples. For certain species the concentration indicated for both epidermides is slightly different from the total of the separate indicated concentrations, because the total was computed and rounded off, prior to rounding off of the separate values. Lamina thickness in mm was determined only for cross sections. Thickness in numbers of cell layers was ascertained, using portions of longitudinal sections containing only epidermal cells and ordinary parenchyma cells.

**These values were obtained from study of unembedded material which was bleached in an aqueous solution of sodium hypochlorite, and mounted in glycerine. Remaining values were determined during study of stained, plastic-embedded material.

TABLE 3

STOMATAL RATIOS IN THE INTERRIDGE AREA*

	Percentage of species with low ratios (0-29)	Percentage of species with moderate ratios (30-99)	Percentage of species with high ratios (100 and higher)
<i>Asplundia</i> (22, 94)	45.5	36.4	18.2
<i>Carludovica</i> (1, 3)	—	—	100
<i>Cyclanthus</i> (1, 1)	100	—	—
<i>Dicranopygium</i> (13, 48)	76.9	—	23.1
<i>Evodianthus</i> (1, 1)	100	—	—
<i>Ludovia</i> (3, 3)	100	—	—
<i>Schultesiophytum</i> (1, 1)	—	—	100
<i>Sphaeradenia</i> (7, 42)	14.3	28.6	57.1
<i>Stelestylis</i> (2, 4)	—	50	50
<i>Thoracocarpus</i> (1, 1)	100	—	—

*In parentheses after the name of each genus are indicated the number of species considered, and the total number of species known, not including undescribed species collected by the writer.

TABLE 4

PERCENTAGES OF STOMATAL COMPLEXES IN THE ABAXIAL EPIDERMIS IN WHICH NEITHER, ONE, OR BOTH NONPOLAR SUBSIDIARY CELL(S) EXTEND(S) TO THE OUTER EDGE(S) OF THE ASSOCIATED CELL FILE(S).*

	Neither extends to outer edge	One extends to outer edge	Both extend to outer edge	One or both extend to outer edge(s) (column 2 + column 3)
<i>A. aff. A. antioquiaae</i> (coll. A)	76.7	20.0	3.3	23.3
<i>A. aff. A. antioquiaae</i> (coll. B)	85.3	13.3	1.3	14.7
<i>A. cabreræ</i>	24.0	47.3	28.7	76.0
<i>A. cayapensis</i>	94.7	5.3	0.0	5.3
<i>A. sp. nov. aff. A.</i> <i>cupulifera</i> (coll. A)	85.3	14.7	0.0	14.7
<i>A. sp. nov. aff. A.</i> <i>cupulifera</i> (coll. B)	95.3	4.7	0.0	4.7
<i>A. gamotepala</i>	67.3	28.0	4.7	32.7
<i>A. hookeri</i>	96.7	3.3	0.0	3.3
<i>A. longitepala</i>	78.7	20.7	0.7	21.3
<i>A. sp. nov. aff. A.</i> <i>longitepala</i>	75.3	22.7	2.0	24.7
<i>A. moritziana</i>	86.0	13.3	0.7	14.0

<i>A. aff. A. moritziana</i>	73.3	25.3	1.3	26.7
<i>A. sp. nov. aff. A. multistaminata</i>	76.7	21.3	2.0	23.3
<i>A. peruviana</i>	37.3	32.0	30.7	62.7
<i>A. pycnantha</i> (n=159)	70.4	24.5	5.0	29.5
<i>A. quinindensis</i>	80.0	18.0	2.0	20.0
<i>A. sp. nov. aff. A. rhodea</i>	97.3	2.7	0.0	2.7
<i>A. rigida</i>	60.0	33.3	6.7	40.0
<i>A. tetragona</i>	86.0	12.7	1.3	14.0
<i>A. urophylla</i>	66.7	29.3	4.0	33.3
<i>A. aff. A. vaupesiana</i> (coll. A)	68.7	26.7	4.7	31.3
<i>A. aff. A. vaupesiana</i> (coll. B)	79.3	20.0	0.7	20.7
<i>A. (Asplundia)</i> sp. nov.	89.3	8.0	2.7	10.7
<i>Ca. palmata</i> (n=107)	12.1	50.5	37.4	87.9
<i>Cy. bipartitus</i> (n=130)	53.8	38.5	7.7	46.2
<i>D. crinitum</i> (n=133)	90.2	9.0	0.8	9.8
<i>D. dolichostemon</i>	96.7	3.3	0.0	3.3
<i>D. globosum</i>	89.3	10.0	0.7	10.7
<i>D. grandifolium</i>	99.3	0.7	0.0	0.7

TABLE 4 (continued)

PERCENTAGES OF STOMATAL COMPLEXES IN THE ABAXIAL EPIDERMIS IN WHICH NEITHER, ONE, OR BOTH NONPOLAR SUBSIDIARY CELL(S) EXTEND(S) TO THE OUTER EDGE(S) OF THE ASSOCIATED CELL FILE(S).*

	Neither extends to outer edge	One extends to outer edge	Both extend to outer edge	One or both extend to outer edge(s) (column 2 + column 3)
<i>D. harlingii</i>	100	0	0	0
<i>D. macrophyllum</i>	95.3	4.7	0.0	4.7
<i>D. mirabile</i>	96.7	3.3	0.0	3.3
<i>D. sp. nov. aff. D. nanum</i>	91.3	8.7	0.0	8.7
<i>D. rheithrophilum</i>	90.0	9.3	0.7	10.0
<i>D. schultesii</i>	93.3	6.7	0.0	6.7
<i>D. wallisii</i>	99.3	0.7	0.0	0.7
<i>D. sp. nov. (coll. A)</i>	100.0	0.0	0.0	0.0
<i>D. sp. nov. (coll. B)</i>	92.0	8.0	0.0	8.0
<i>E. funifer</i> (n=122)	45.1	39.3	15.6	54.9
<i>L. bierhorstii</i>	92.0	7.3	0.7	8.0
<i>L. integrifolia</i>	18.0	49.3	32.7	82.0
<i>L. lancifolia</i> (n=134)	28.4	43.3	28.4	71.7
<i>Sch. chorianthum</i>	96.0	4.0	0.0	4.0

<i>Sph. acutitepala</i>	2.0	26.0	72.0	98.0
<i>Sph. crocea</i>	1.3	31.3	67.3	98.7
<i>Sph. killipii</i> (n=151)	15.2	48.3	36.4	84.7
<i>Sph. snidernii</i> (n=151)	39.1	46.4	14.6	60.9
<i>Sph. woodsonii</i>	47.3	40.0	12.7	52.7
<i>Sph. sp. nov. aff.</i> <i>Sph. woodsonii</i>	24.7	47.3	28.0	75.3
<i>Sph. sp. nov.</i>	53.3	40.0	6.7	46.7
<i>St. anomala</i>	8.0	37.3	54.7	92.0
<i>St. stylaris</i> (n=131)	11.5	47.3	41.2	88.5
<i>T. bissectus</i> (n=129)	25.6	45.0	29.5	74.5

*For each species, one-hundred and fifty stomata were examined in an epidermal peel, except where another number is indicated in parentheses after the species name. As often as possible in a peel, fields were studied which were laterally rather than vertically adjacent to one another, to maximize randomness of sampling. Observations of *Cy. bipartitus* were subject to error because longitudinal files of ordinary epidermal cells tend to be difficult to identify in this species.

TABLE 5

PERCENTAGES OF SPECIES IN WHICH LOW, MODERATE, OR HIGH PERCENTAGES OF COMPLEXES EXHIBIT ONE OR TWO NONPOLAR SUBSIDIARY CELL(S) WHICH EXTEND TO THE OUTER EDGE(S) OF THE ASSOCIATED CELL FILE(S)*

	Percentage of species with low percentages of such complexes (1-11%)	Percentage of species with moderate percentages of such complexes (12-44%)	Percentage of species with high percentages of such complexes (45-99%)
<i>Asplundia</i> (23, 94)	21.7%	69.6%	8.7%
<i>Carludovica</i> (1, 3)	-	-	100%
<i>Cyclanthus</i> (1, 1)	-	-	100%
<i>Dicranopygium</i> (13, 48)	100%	-	-
<i>Evodianthus</i> (1, 1)	-	-	100%
<i>Ludovia</i> (3, 3)	33.3%	-	66.6%
<i>Schultesiophytum</i> (1, 1)	100%	-	-
<i>Sphaeradenia</i> (7, 42)	-	-	100%
<i>Stelestylis</i> (2, 4)	-	-	100%
<i>Thoracocarpus</i> (1, 1)	-	-	100%

*In parentheses after the name of each genus are indicated the number of species considered, and the total number of species known, not including undescribed species collected by the writer.

TABLE 6

CONTACTS BETWEEN STOMATAL COMPLEXES

	Percentage of stomatal complexes in contact with one or more other stomatal complexes	Percentage of stomatal complexes which share subsidiary cells	Percentage of contacts which entail sharing of subsidiary cells (column 2/column 1)	Types of sharing of subsidiary cells by two adjacent stomatal complexes*
<i>Asplundia pycnantha</i>	50.3% (n=150 complexes)	2% (n=200 complexes)	4.0%	Type 1: 100% (n=2 pairs of complexes)
<i>Carludovica palmata</i>	64.2% (n=151)	—	—	—
<i>Cyclanthus bipartitus</i>	97.0% (n=131)	11% (n=200)	11.3%	Type 1: 54.5% Type 2: 27.3% Type 3: 18.2% (n=11)
<i>Dicranopygium crinitum</i>	49.1% (n=159)	2% (n=200)	4.1%	Type 1: 100% (n=2)
<i>Evodianthus funifer</i>	47.7% (n=155)	0% (n=200)	0%	0%
<i>Ludovia lancifolia</i>	4% (n=200)	0% (n=200)	0%	0%
<i>Schultesiophytum chorianthum</i>	66.9% (n=154)	2% (n=200)	3.0%	Type 1: 50% Type 2: 50% (n=2)
<i>Sphaeradenia killipii</i>	65.4% (n=153)	7% (n=200)	10.7%	Type 1: 100% (n=7)
<i>Stelestylis stylaris</i>	70.9% (n=182)	7% (n=200)	9.9%	Type 1: 85.7% (n=7) Type 3: 14.3%
<i>Thoracocarpus bissectus</i>	78.3% (n=143)	6% (n=200)	7.7%	Type 1: 33.3% Type 3: 66.6% (n=6)

*Types of sharing are defined by Wilder (in press a).

INTRODUCTION TO TABLES 7, 9-11
(Wilder, in press *b*)*

Within interridge areas and between boundary layers, portions of cyclanthaceous laminae exhibit either two (adaxial and abaxial) or three main regions of mesophyll (adaxial, middle, and abaxial; Table 7). The adaxial region is only sometimes a palisade region, whereas, the middle and abaxial regions are spongy mesophyll. Regions of mesophyll are distinguished mostly according to features of ordinary parenchyma cells. These cells may exhibit various ergastic materials, including starch, tannin, and different kinds of crystals. In certain species some cells also contain star figures, i.e., small or large stellate inclusions tentatively interpreted as tannin. In most species ordinary parenchyma cells are essentially monomorphic, but in two species of *Dicranopygium* these cells exhibit pronounced dimorphism (Table 8). Fibers occur in the mesophyll of all species studied, but differ quantitatively between various species (Tables 9-11). Parenchyma-like dead cells were observed in several and all species of the *Asplundia* group and *Sphaeradenia* group, respectively, but only such cells of the *Sphaeradenia* group exhibited conspicuously birefringent cell walls. Those dead cells with birefringent walls, therefore, constitute an extremely important systematic-anatomical character within the Cyclanthaceae.

*Table no. 8 is included in Wilder (in press *b*), where it is listed as Table 1.

TABLE 7
SPECIES WITH THREE MAIN REGIONS OF MESOPHYLL
(ALL UNLISTED SPECIES HAVE TWO REGIONS).

<i>A. cabreræ</i>
<i>A. cayapensis</i>
<i>A. gamotepala</i>
<i>A. moritziana</i>
<i>A. aff. A. moritziana</i>
<i>A. pycnantha</i>
<i>A. sp. nov. aff. A. rhodea</i>
<i>A. tetragona</i>
<i>A. aff. A. vaupesiana</i> (coll. <i>A</i>)
<i>Cy. bipartitus</i>
<i>E. funifer</i>
<i>L. lancifolia</i>
<i>Sph. snidernii</i>
<i>Sph. sp. nov. aff. Sph. woodsonii</i>
<i>St. stylaris</i>
<i>T. bissectus</i>

TABLE 9
DATA PERTAINING TO FIBER STRANDS OF THE MESOPHYLL

Species	No. of fiber strands/mm width of interridge area (in parentheses are indicated no. of strands counted and width of portion(s) of lamina considered in mm, respectively)	Percentage of fiber strands on adaxial half of interridge area (in parentheses are indicated no. of strands counted on adaxial and both sides of lamina, respectively)
<i>A. aff. A. antioquiæ</i> (coll. <i>A</i>)	29 (189, 6.64)	55.0 (104, 189)
<i>A. aff. A. antioquiæ</i> (coll. <i>B</i>)	28 (203, 7.24)	64.5 (131, 203)
<i>A. cabreræ</i>	83 (224, 2.72)	60.3 (135, 224)
<i>A. cayapensis</i>	49 (119, 2.45)	59.7 (71, 119)

TABLE 9 (*continued*)
DATA PERTAINING TO FIBER STRANDS OF THE MESOPHYLL

Species	No. of fiber strands/mm width of interr ridge area (in parentheses are indicated no. of strands counted and width of portion(s) of lamina considered in mm, respectively)	Percentage of fiber strands on adaxial half of interr ridge area (in parentheses are indicated no. of strands counted on adaxial and both sides of lamina, respectively)
<i>A. sp. nov. aff. A. cupulifera</i> (coll. <i>A</i>)	39 (311, 8.01)	54.0 (168, 311)
<i>A. sp. nov. aff. A. cupulifera</i> (coll. <i>B</i>)	78 (510, 6.54)	55.5 (283, 510)
<i>A. gamotepala</i>	93 (210, 2.26)	56.7 (119, 210)
<i>A. hookeri</i>	17 (94, 5.58)	48.9 (46, 94)
<i>A. longitepala</i>	18 (78, 4.44)	69.2 (54, 78)
<i>A. sp. nov. aff. A. longitepala</i>	48 (224, 4.70)	55.8 (125, 224)
<i>A. moritziana</i>	26 (196, 7.45)	52.0 (102, 196)
<i>A. aff. A. moritziana</i>	20 (119, 5.93)	58.0 (69, 119)
<i>A. sp. nov. aff. A. multistaminata</i>	24 (91, 3.83)	58.2 (53, 91)
<i>A. peruviana</i>	46 (205, 4.41)	61.5 (126, 205)
<i>A. pycnantha</i>	65 (327, 5.06)	55.0 (180, 327)
<i>A. quinindensis</i>	49 (232, 4.73)	56.5 (131, 232)
<i>A. sp. nov. aff. A. rhodea</i>	32 (99, 3.06)	57.6 (57, 99)
<i>A. rigida</i>	28 (172, 6.13)	57.6 (99, 172)
<i>A. tetragona</i>	38 (158, 4.19)	51.9 (82, 158)
<i>A. urophylla</i>	19 (121, 6.55)	61.2 (74, 121)
<i>A. aff. A. vaupesiana</i> (coll. <i>A</i>)	92 (366, 4.00)	63.7 (233, 366)
<i>A. aff. A. vaupesiana</i> (coll. <i>B</i>)	24 (127, 5.23)	70.1 (89, 127)
<i>A. (Asplundia)</i> sp. nov.	28 (127, 4.61)	59.2 (109, 184)
<i>Ca. palmata</i>	66 (480, 7.26)	61.7 (296, 480)
<i>Cy. bipartitus</i>	5.8 (46, 8.00)	97.8 (45, 46)
<i>D. crinitum</i>	40 (176, 4.41)	55.1 (97, 176)

TABLE 9 (continued)
DATA PERTAINING TO FIBER STRANDS OF THE MESOPHYLL

Species	No. of fiber strands/mm width of interr ridge area (in parentheses are indicated no. of strands counted and width of portion(s) of lamina considered in mm, respectively)	Percentage of fiber strands on adaxial half of interr ridge area (in parentheses are indicated no. of strands counted on adaxial and both sides of lamina, respectively)
<i>D. dolichostemon</i>	13 (48, 3.63)	58.3 (28, 48)
<i>D. globosum</i>	13 (93, 7.27)	46.2 (43, 93)
<i>D. grandifolium</i>	12 (55, 4.66)	58.2 (32, 55)
<i>D. harlingii</i>	4.3 (23, 5.31)	100 (36, 36)
<i>D. macrophyllum</i>	27 (111, 4.12)	36.0 (40, 111)
<i>D. mirabile</i>	5.7 (31, 5.46)	71.0 (22, 31)
<i>D. sp. nov. aff. D. nanum</i>	9.5 (89, 9.05)	96.6 (86, 89)
<i>D. rheithrophilum</i>	24 (153, 6.37)	56.2 (86, 153)
<i>D. schultesii</i>	20 (99, 4.91)	59.6 (59, 99)
<i>D. wallisii</i>	19 (139, 7.49)	64.7 (90, 139)
<i>D. sp. nov. (coll. A)</i>	8.0 (79, 9.83)	50.6 (40, 79)
<i>D. sp. nov. (coll. B)</i>	17 (132, 7.59)	44.7 (59, 132)
<i>E. funifer</i>	46 (154, 3.39)	56.1 (83, 148)
<i>L. bierhorstii</i>	13 (67, 5.25)	82.1 (55, 67)
<i>L. integrifolia</i>	29 (101, 3.47)	53.5 (54, 101)
<i>L. lancifolia</i>	75 (482, 6.41)	57.1 (275, 482)
<i>Sch. chorianthum</i>	24 (110, 4.62)	64.9 (72, 111)
<i>Sph. acutitepala</i>	56 (333, 5.91)	50.5 (168, 333)
<i>Sph. crocea</i>	27 (276, 10.2)	56.5 (156, 276)
<i>Sph. killipii</i>	73 (456, 6.25)	50.2 (229, 456)
<i>Sph. snidernii</i>	30 (171, 5.65)	53.8 (92, 171)
<i>Sph. woodsonii</i>	108 (209, 1.93)	58.9 (123, 209)
<i>Sph. sp. nov. aff. Sph. woodsonii</i>	49 (308, 6.26)	66.2 (204, 308)
<i>Sph. sp. nov.</i>	30 (188, 6.27)	41.0 (77, 188)
<i>St. anomala</i>	41 (185, 4.48)	60.0 (111, 185)
<i>St. stylaris</i>	38 (397, 10.4)	56.2 (223, 397)
<i>T. bissectus</i>	86 (684, 7.95)	56.5 (375, 664)

TABLE 10
CONCENTRATION OF FIBER STRANDS IN INTERRIDGE AREAS*

Genus	Percentage of species with low concentration (0-19.9/ mm width)	Percentage of species with moderate concentration 20-49.9/ mm width)	Percentage of species with high concentration (50-109.9/ mm width)
<i>Asplundia</i> (23, 94)	13.0%	65.2%	21.7%
<i>Carludovica</i> (1, 3)			100%
<i>Cyclanthus</i> (1, 1)	100%		
<i>Dicranopygium</i> (13, 48)	69.2%	30.8%	
<i>Evodianthus</i> (1, 1)		100%	
<i>Ludovia</i> (3, 3)	33.3%	33.3%	33.3%
<i>Schultesiophytum</i> (1, 1)		100%	
<i>Sphaeradenia</i> (7, 42)		57.1%	42.9%
<i>Stelestylis</i> (2, 4)		100%	
<i>Thoracocarpus</i> (1, 1)			100%

*In parentheses after the name of each genus are indicated the number of species considered and the total number of species per genus, respectively (not including undescribed species presently studied).

TABLE 11
DATA PERTAINING TO FIBER STRANDS OF THE MESOPHYLL

	Percentage of fiber strands on both sides of lamina which are in subepidermal layers*	Percentage of adaxially situated fiber strands in adaxial subepidermal layer*	Percentage of abaxially situated fiber strands in abaxial subepidermal layer*	Mean numbers of hypodermal parenchyma cells intervening between adjacent pairs of fiber strands in adaxial subepidermal layer**
<i>A. pycnantha</i>	43.4 (334)	46.8 (190)	38.9 (144)	2.38 (50)
<i>Ca. palmata</i>	43.8 (482)	53.8 (296)	28.0 (186)	1.70 (50)
<i>Cy. bipartitus</i>	53.1 (49)	54.2 (48)	0 (1)	10.4 (23)
<i>D. crinitum</i>	31.9 (329)	34.2 (184)	29.0 (145)	4.72 (50)
<i>E. funifer</i>	79.9 (289)	82.7 (173)	75.9 (116)	1.46 (50)
<i>L. lancifolia</i>	48.5 (482)	48.4 (275)	48.8 (207)	1.40 (50)
<i>Sch. chorianthum</i>	75.4 (187)	68.3 (123)	89.1 (64)	3.68 (40)
<i>Sph. killipii</i>	83.1 (455)	79.9 (229)	86.3 (226)	1.06 (50)
<i>St. stylaris</i>	86.4 (397)	88.3 (223)	83.9 (174)	1.06 (50)
<i>T. bissectus</i>	29.1 (663)	38.0 (371)	17.8 (292)	2.14 (50)

*In parentheses are indicated number of fiber strands observed.

**In parentheses are indicated number of fiber strand pairs observed.

INTRODUCTION TO TABLES 12-13
(Wilder, in press c)

Within interridge areas and between boundary layers cyclanthaceous laminae exhibit raphide sacs and, sometimes, also styloid sacs and/or sacs intermediate between raphide and styloid sacs (Tables 12, 13). These crystal sacs normally lack chloroplasts, but at least sometimes contain leucoplasts and, apparently, normal nuclei. In raphide sacs the raphides usually comprise an orderly array, and are sometimes compound. Styloid sacs occur in *Evodianthus funifer* and all species studied of *Sphaeradenia* and *Stelestylis*, but are less common among remaining species of Carludovicoideae. In almost all species raphide and styloid sacs tend to be oriented along paradermal planes; however, in *E. funifer* the styloid sacs normally lie in all directions within the mesophyll. Scattered regions of periderm occur in various species, apparently, because of wounding. I have developed a concept of boundary layers. A boundary layer separates ordinary mesophyll tissue from another part of the plant. Cyclanthaceous laminae exhibit four types of boundary layers, viz., hypodermis, bundle sheath, epithelium of mucilage cavities, and laticifer sheath. All boundary layers exhibit significant features in common, in addition to position, including aspects of intercellular spaces between their constituent cells, and chloroplast position. In the adaxial hypodermis the shapes of hypodermal parenchyma cells in surface view are very predictable.

TABLE 12
KINDS OF CRYSTAL SACS PRESENT WITHIN INTERRIDGE AREAS
OF CYCLANTHACEOUS LAMINAE.

Species	Raphide sacs not of boundary layers	Styloid sacs not of boundary layers	Subepidermal raphide sacs	Subepidermal styloid sacs
<i>A. aff. A. antioquiae</i> (coll. <i>A</i>)	+			
<i>A. aff. A. antioquiae</i> (coll. <i>B</i>)	+		+	
<i>A. cabreræ</i>	+			
<i>A. cayapensis</i>	+(I)	+(I)		
<i>A. sp. nov. aff. A. cupulifera</i> (coll. <i>A</i>)	+(S)		+	
<i>A. sp. nov. aff. A. cupulifera</i> (coll. <i>B</i>)	+		+	
<i>A. gamotepala</i>	+			
<i>A. hookeri</i>	+(I)	+(I)	+	
<i>A. longitepala</i>	+			
<i>A. sp. nov. aff. A. longitepala</i>	+			
<i>A. moritziana</i>	+			
<i>A. aff. A. moritziana</i>	+		+	
<i>A. sp. nov. aff. A. multistaminata</i>	+			
<i>A. peruviana</i>	+		+	
<i>A. pycnantha</i>	+(S)		+	
<i>A. quinindensis</i>	+			
<i>A. sp. nov. aff. A. rhodea</i>	+		+	
<i>A. rigida</i>	+		+	
<i>A. tetragona</i>	+		+	
<i>A. urophylla</i>	+			
<i>A. aff. A. vaupesiana</i> (coll. <i>A</i>)	+		+	
<i>A. aff. A. vaupesiana</i> (coll. <i>B</i>)	+		+	
<i>A. (Asplundia) sp. nov.</i>	+			
<i>Ca. palmata</i>	+(I)	+(I)	+	+
<i>Cy. bipartitus</i>	+	+(Bu)	+	

TABLE 12 (Continued)
KINDS OF CRYSTAL SACS PRESENT WITHIN INTERRIDGE AREAS
OF CYCLANTHACEOUS LAMINAE.

Species	Raphide sacs not of boundary layers	Styloid sacs not of boundary layers	Subepidermal raphide sacs	Subepidermal styloid sacs
<i>D. crinitum</i>	+		+	
<i>D. dolichostemon</i>	+(I)	+(I)	+	
<i>D. globosum</i>	+		+	
<i>D. grandifolium</i>	+			
<i>D. harlingii</i>	+		+	
<i>D. macrophyllum</i>	+		+	
<i>D. mirabile</i>	+			
<i>D. sp. nov. aff. D. nanum</i>	+(S)		+	
<i>D. rheithrophilum</i>	+		+	
<i>D. schultesii</i>	+			
<i>D. wallisii</i>	+			
<i>D. sp. nov. (coll. A)</i>	+			
<i>D. sp. nov. (coll. B)</i>	+		+	
<i>E. funifer</i>	+	+		+
<i>L. bierhorstii</i>	+		+	
<i>L. integrifolia</i>	+		+	
<i>L. lancifolia</i>	+		+	
<i>Sch. chorianthum</i>	+			
<i>Sph. acutitepala</i>	+	+		+
<i>Sph. crocea</i>	+	+		+
<i>Sph. killipii</i>	+	+	+	
<i>Sph. snidernii</i>	+	+		
<i>Sph. woodsonii</i>	+	+		+
<i>Sph. sp. nov. aff. Sph. woodsonii</i>	+	+		
<i>Sph. sp. nov.</i>	+	+	+	
<i>St. anomala</i>	+	+		+

TABLE 12 (Continued)
KINDS OF CRYSTAL SACS PRESENT WITHIN INTERRIDGE AREAS
OF CYCLANTHACEOUS LAMINAE.

Species	Raphide sacs not of boundary layers	Styloid sacs not of boundary layers	Subepidermal raphide sacs	Subepidermal styloid sacs
<i>St. stylaris</i>	+	+		+
<i>T. bissectus</i>	+			

- + = present and well-defined.
- +(I) = typical raphide sacs, styloid sacs, and all intermediates between these two cell types are present.
- +(S) = some sacs have small numbers of crystals which mostly tend to be intermediate between raphides and styloids, but well-defined styloids are generally absent.
- (Bu) = styloid sacs are mainly limited to bundle sheaths, where they occur together with raphide sacs and intermediate types of sacs.

TABLE 13

LENGTHS OF RAPHADE BUNDLES AND STYLOIDS IN CLEARED LAMINAE (μm , MEASURED USING CROSSED POLARS)

	Raphide bundles of abaxial subepidermal layer*				Raphide bundles of adaxial subepidermal layer*				Raphide bundles of portions of mesophyll not belonging to boundary layers**				Styloids of portions of mesophyll not be- longing to boundary layers**			
	Range	Mean	Standard Deviation	Sample	Range	Mean	Standard Deviation	Sample	Range	Mean	Standard Deviation	Sample	Range	Mean	Standard Deviation	Sample
<i>Asplundia tetragona</i>	23-50	36.7	7.11	25	23-48	35.4	4.95	25	52-407	229	94.0	20				
<i>Dicranopygium dolichostemon</i>	31-115	62.2	22	25	46-145	83.5	31.5	7	46-229	141	45.8	25	172-330	223	37.1	25
<i>Dicranopygium harlingii</i>	29-88	47.1	11.0	25	44-88	63.9	11.7	25	80-199	129	30.0	25				
<i>Dicranopygium</i> sp. nov. (coll. B)	31-84	52.4	13.4	25	42-86	65.2	10.0	25	94-153	118	15.8	25				
<i>Ludovia bierhorstii</i>	23-55	37.4	8.27	25	21-48	30.6	5.88	25	29-273	169	85.2	25				
<i>Sphaeradenia</i> sp. nov.	15-40	26.8	4.87	25	27-65	41.2	7.32	25	74-107	86.7	7.75	25	57-191	148	33.6	25

*In *D. sp. nov.* bundles of the adaxial and abaxial hypodermides are commonly oriented anticlinally or nearly so; only bundles with essentially paradermal orientations were measured.

**In *D. dolichostemon* with all intermediates between raphides and styloids, crystals were measured only if they were clearly raphides (very narrow crystals, generally many per bundle) or styloids (broad crystals, one to several per crystal sac). In *Sph. sp. nov.* some raphide bundles in the cell layer immediately beneath the adaxial hypodermis were oriented anticlinally or nearly so, and were not measured.

INTRODUCTION TO TABLES 14-16
(Wilder, in press *d*)

Interridge areas of cyclanthaceous laminae exhibit longitudinal veins and commissural veins which vary from transverse to oblique. In at least some species of the *Asplundia* group, but not all of the *Sphaeradenia* group, these longitudinal veins tend to be oriented nearest the abaxial surface of the lamina (Table 14). In many species longitudinal veins of interridge areas are of discrete orders, and up to a given order the number of veins of an order is twice, or nearly twice that of the next lower order (Table 15). Whereas, longitudinal veins of interridge areas are normally upright, commissures vary from upright to inverted. In ten species cleared portions of lamina each measuring 120 mm² exhibited from six to forty-seven commissures (Table 16). Expansion tissue and presumed expansion tissue develop in all species of *Carludovicoideae* and in *Cyclanthus bipartitus*, respectively. Adaxial and abaxial ridges are mostly associated with one or more longitudinal veins. The main vein of a ridge is normally upright, whereas, additional vein(s) may be upright or inverted to various degrees. In interridge areas and ridges longitudinal veins are normally collateral, but bicollateral, amphivasal, and amphicribal veins may also be present.

TABLE 14
 POSITIONS OF LONGITUDINAL VEINS IN TERRIDGE AREAS (CARLUDOVICOIDEAE) OR
 NONCOSTAL PORTIONS OF LAMINA (CYCLANTHOIDEAE) RELATIVE TO THE ADAXIAL
 AND ABAXIAL SURFACES OF THE LAMINA.*

	Percentage of veins situated nearest the abaxial surface	Percentage of veins situated ca. equidistant between the two surfaces	Percentage of veins situated nearest the adaxial surface
CYCLANTHOIDEAE			
<i>Cyclanthus bipartitus</i> (20)	100	—	—
CARLUDOVICOIDEAE			
ASPLUNDIA GROUP			
<i>A. pycnantha</i> (20)	100	—	—
<i>Ca. palmata</i> (20)	100	—	—
<i>D. crinitum</i> (20)	100	—	—
<i>E. funifer</i> (20)	95	5	—
<i>Sch. chorianthum</i> (18)	100	—	—
<i>T. bissectus</i> (20)	100	—	—
SPHAERADENIA GROUP			
<i>L. lancifolia</i> (16)	31	31	38
<i>Sph. killipii</i> (18)	39	—	61
<i>St. stylaris</i> (20)	80	5	15

*Fig. 10-12, 14-16, 18-20, 22-24, 26-28, 30-32, 34-36, 38-40, 42-44, 46-48, 50-52, 54-56, 58-60, 62-64, 66-68, 70-72, 74-76, 78-80, 82-84, 86-88, 90-92, 94-96, 98-100, 102-104, 106-108, 110-112, 114-116, 118-120, 122-124, 126-128, 130-132, 134-136, 138-140, 142-144, 146-148, 150-152, 154-156, 158-160, 162-164, 166-168, 170-172, 174-176, 178-180, 182-184, 186-188, 190-192, 194-196, 198-200, 202-204, 206-208, 210-212, 214-216, 218-220, 222-224, 226-228, 230-232, 234-236, 238-240, 242-244, 246-248, 250-252, 254-256, 258-260, 262-264, 266-268, 270-272, 274-276, 278-280, 282-284, 286-288, 290-292, 294-296, 298-300, 302-304, 306-308, 310-312, 314-316, 318-320, 322-324, 326-328, 330-332, 334-336, 338-340, 342-344, 346-348, 350-352, 354-356, 358-360, 362-364, 366-368, 370-372, 374-376, 378-380, 382-384, 386-388, 390-392, 394-396, 398-400, 402-404, 406-408, 410-412, 414-416, 418-420, 422-424, 426-428, 430-432, 434-436, 438-440, 442-444, 446-448, 450-452, 454-456, 458-460, 462-464, 466-468, 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914-916, 918-920, 922-924, 926-928, 930-932, 934-936, 938-940, 942-944, 946-948, 950-952, 954-956, 958-960, 962-964, 966-968, 970-972, 974-976, 978-980, 982-984, 986-988, 990-992, 994-996, 998-1000, 1002-1004, 1006-1008, 1010-1012, 1014-1016, 1018-1020, 1022-1024, 1026-1028, 1030-1032, 1034-1036, 1038-1040, 1042-1044, 1046-1048, 1050-1052, 1054-1056, 1058-1060, 1062-1064, 1066-1068, 1070-1072, 1074-1076, 1078-1080, 1082-1084, 1086-1088, 1090-1092, 1094-1096, 1098-1100, 1102-1104, 1106-1108, 1110-1112, 1114-1116, 1118-1120, 1122-1124, 1126-1128, 1130-1132, 1134-1136, 1138-1140, 1142-1144, 1146-1148, 1150-1152, 1154-1156, 1158-1160, 1162-1164, 1166-1168, 1170-1172, 1174-1176, 1178-1180, 1182-1184, 1186-1188, 1190-1192, 1194-1196, 1198-1200, 1202-1204, 1206-1208, 1210-1212, 1214-1216, 1218-1220, 1222-1224, 1226-1228, 1230-1232, 1234-1236, 1238-1240, 1242-1244, 1246-1248, 1250-1252, 1254-1256, 1258-1260, 1262-1264, 1266-1268, 1270-1272, 1274-1276, 1278-1280, 1282-1284, 1286-1288, 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TABLE 15

MEAN PERCENTAGES OF THE EXPECTED NUMBERS OF LONGITUDINAL VEINS OF EACH ORDER PRESENT IN THE
 INTERRIDGE AREAS OF TWENTY-TWO SPECIES OF *ASPLUNDIA*, TEN OF *DICRANOPYGIUM*, AND FOUR OF
SPHAERADENIA, AND STANDARD DEVIATIONS.* **

	First Order	Second Order	Third Order	Fourth Order	Fifth Order	Sixth Order	Seventh and Higher Orders
<i>Asplundia</i> (29)	100, 0	100, 0	98.9, 5.33	71.9, 33.4	15.3, 21.6	0.43, 1.46	0, 0
<i>Dicranopygium</i> (15.5)	100, 0	98.3, 5.28	90, 19.2	48.3, 37.9	5.63, 9.41	0, 0	0, 0
<i>Sphaeradenia</i> (4)	100, 0	100, 0	100, 0	68.8, 33.1	35.9, 35.5	1.56, 1.80	0,0

*The mean percentages for each genus were computed as follows. For every species the percentage of the expected number of veins present of each order was determined, based on a sample of one to several interr ridge areas. Then, the percentages for each order of vein were averaged for all species (the species being weighted equally, regardless of the number of interr ridge areas counted per species).

**In parentheses after the name of each genus is indicated the number of interr ridge areas examined of all species.

TABLE 16
NUMBERS OF COMMISSURES WITHIN 120 mm² OF LAMINA, AWAY
FROM COSTAE*

SPECIES	NUMBER OF COMMISSURES
<i>A. pycnantha</i>	10
<i>Ca. palmata</i>	31
<i>Cy. bipartitus</i>	31
<i>D. crinitum</i>	47
<i>E. funifer</i>	12
<i>L. lancifolia</i>	10
<i>Sch. chorianthum</i>	45
<i>Sph. killipii</i>	10
<i>St. stylaris</i>	14-15
<i>T. bissectus</i>	6

*Branches of commissures were counted as separate commissures. For example, in a case where a commissure became divided into two parts at one end, the undivided portion and its two products were interpreted to represent a total of two commissures.

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