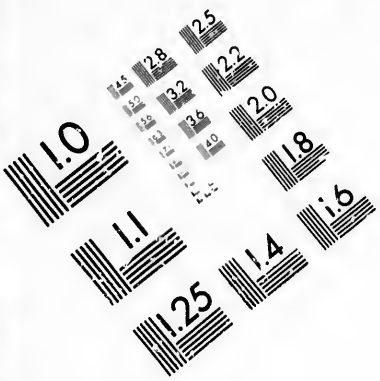

1.0
1.1
1.25
1.4
1.6
1.8
2.0
2.2
2.5
2.8
3.2
3.6
4.0
4.5
5.0
5.6
6.3
7.1
8.0
9.0
10
11
12
13
14
16
18
20
22
25
28
32
36
40
45
50
56
63
71
80
90
100
110
125
140
160
180
200
220
250
280
320
360
400
450
500
560
630
710
800
900
1000
1100
1250
1400
1600
1800
2000
2200
2500
2800
3200
3600
4000
4500
5000
5600
6300
7100
8000
9000
10000
11000
12500
14000
16000
18000
20000
22000
25000
28000
32000
36000
40000
45000
50000
56000
63000
71000
80000
90000
100000
110000
125000
140000
160000
180000
200000
220000
250000
280000
320000
360000
400000
450000
500000
560000
630000
710000
800000
900000
1000000
1100000
1250000
1400000
1600000
1800000
2000000
2200000
2500000
2800000
3200000
3600000
4000000
4500000
5000000
5600000
6300000
7100000
8000000
9000000
10000000
11000000
12500000
14000000
16000000
18000000
20000000
22000000
25000000
28000000
32000000
36000000
40000000
45000000
50000000
56000000
63000000
71000000
80000000
90000000
100000000
110000000
125000000
140000000
160000000
180000000
200000000
220000000
250000000
280000000
320000000
360000000
400000000
450000000
500000000
560000000
630000000
710000000
800000000
900000000
1000000000
1100000000
1250000000
1400000000
1600000000
1800000000
2000000000
2200000000
2500000000
2800000000
3200000000
3600000000
4000000000
4500000000
5000000000
5600000000
6300000000
7100000000
8000000000
9000000000
10000000000
11000000000
12500000000
14000000000
16000000000
18000000000
20000000000
22000000000
25000000000
28000000000
32000000000
36000000000
40000000000
45000000000
50000000000
56000000000
63000000000
71000000000
80000000000
90000000000
100000000000
110000000000
125000000000
140000000000
160000000000
180000000000
200000000000
220000000000
250000000000
280000000000
320000000000
360000000000
400000000000
450000000000
500000000000
560000000000
630000000000
710000000000
800000000000
900000000000
1000000000000
1100000000000
1250000000000
1400000000000
1600000000000
1800000000000
2000000000000
2200000000000
2500000000000
2800000000000
3200000000000
3600000000000
4000000000000
4500000000000
5000000000000
5600000000000
6300000000000
7100000000000
8000000000000
9000000000000
10000000000000
11000000000000
12500000000000
14000000000000
16000000000000
18000000000000
20000000000000
22000000000000
25000000000000
28000000000000
32000000000000
36000000000000
40000000000000
45000000000000
50000000000000
56000000000000
63000000000000
71000000000000
80000000000000
90000000000000
100000000000000
110000000000000
125000000000000
140000000000000
160000000000000
180000000000000
200000000000000
220000000000000
250000000000000
280000000000000
320000000000000
360000000000000
400000000000000
450000000000000
500000000000000
560000000000000
630000000000000
710000000000000
800000000000000
900000000000000
1000000000000000
1100000000000000
1250000000000000
1400000000000000
1600000000000000
1800000000000000
2000000000000000
2200000000000000
2500000000000000
2800000000000000
3200000000000000
3600000000000000
4000000000000000
4500000000000000
5000000000000000
5600000000000000
6300000000000000
7100000000000000
8000000000000000
9000000000000000
10000000000000000
11000000000000000
12500000000000000
14000000000000000
16000000000000000
18000000000000000
20000000000000000
22000000000000000
25000000000000000
28000000000000000
32000000000000000
36000000000000000
40000000000000000
45000000000000000
50000000000000000
56000000000000000
63000000000000000
71000000000000000
80000000000000000
90000000000000000
100000000000000000
110000000000000000
125000000000000000
140000000000000000
160000000000000000
180000000000000000
200000000000000000
220000000000000000
250000000000000000
280000000000000000
320000000000000000
360000000000000000
400000000000000000
450000000000000000
500000000000000000
560000000000000000
630000000000000000
710000000000000000
800000000000000000
900000000000000000
1000000000000000000
1100000000000000000
1250000000000000000
1400000000000000000
1600000000000000000
1800000000000000000
2000000000000000000
2200000000000000000
2500000000000000000
2800000000000000000
3200000000000000000
3600000000000000000
4000000000000000000
4500000000000000000
5000000000000000000
5600000000000000000
6300000000000000000
7100000000000000000
8000000000000000000
9000000000000000000
10000000000000000000
11000000000000000000
12500000000000000000
14000000000000000000
16000000000000000000
18000000000000000000
20000000000000000000
22000000000000000000
25000000000000000000
28000000000000000000
32000000000000000000
36000000000000000000
40000000000000000000
45000000000000000000
50000000000000000000
56000000000000000000
63000000000000000000
71000000000000000000
80000000000000000000
90000000000000000000
100000000000000000000
110000000000000000000
125000000000000000000
140000000000000000000
160000000000000000000
180000000000000000000
200000000000000000000
220000000000000000000
250000000000000000000
280000000000000000000
320000000000000000000
360000000000000000000
400000000000000000000
450000000000000000000
500000000000000000000
560000000000000000000
630000000000000000000
710000000000000000000
800000000000000000000
900000000000000000000
1000000000000000000000
1100000000000000000000
1250000000000000000000
1400000000000000000000
1600000000000000000000
1800000000000000000000
2000000000000000000000
2200000000000000000000
2500000000000000000000
2800000000000000000000
3200000000000000000000
3600000000000000000000
4000000000000000000000
4500000000000000000000
5000000000000000000000
5600000000000000000000
6300000000000000000000
7100000000000000000000
8000000000000000000000
9000000000000000000000
10000000000000000000000
11000000000000000000000
12500000000000000000000
14000000000000000000000
16000000000000000000000
18000000000000000000000
20000000000000000000000
22000000000000000000000
25000000000000000000000
28000000000000000000000
32000000000000000000000
36000000000000000000000
40000000000000000000000
45000000000000000000000
50000000000000000000000
56000000000000000000000
63000000000000000000000
71000000000000000000000
80000000000000000000000
90000000000000000000000
100000000000000000000000
110000000000000000000000
125000000000000000000000
140000000000000000000000
160000000000000000000000
180000000000000000000000
200000000000000000000000
220000000000000000000000
250000000000000000000000
280000000000000000000000
320000000000000000000000
360000000000000000000000
400000000000000000000000
450000000000000000000000
500000000000000000000000
560000000000000000000000
630000000000000000000000
710000000000000000000000
800000000000000000000000
900000000000000000000000
1000000000000000000000000
1100000000000000000000000
1250000000000000000000000
1400000000000000000000000
1600000000000000000000000
1800000000000000000000000
2000000000000000000000000
2200000000000000000000000
2500000000000000000000000
2800000000000000000000000
3200000000000000000000000
3600000000000000000000000
4000000000000000000000000
4500000000000000000000000
5000000000000000000000000
5600000000000000000000000
6300000000000000000000000
7100000000000000000000000
8000000000000000000000000
9000000000000000000000000
10000000000000000000000000
11000000000000000000000000
12500000000000000000000000
14000000000000000000000000
16000000000000000000000000
18000000000000000000000000
20000000000000000000000000
22000000000000000000000000
25000000000000000000000000
28000000000000000000000000
32000000000000000000000000
36000000000000000000000000
40000000000000000000000000
45000000000000000000000000
50000000000000000000000000
56000000000000000000000000
63000000000000000000000000
71000000000000000000000000
80000000000000000000000000
90000000000000000000000000
100000000000000000000000000
110000000000000000000000000
125000000000000000000000000
140000000000000000000000000
160000000000000000000000000
180000000000000000000000000
200000000000000000000000000
220000000000000000000000000
250000000000000000000000000
280000000000000000000000000
320000000000000000000000000
360000000000000000000000000
400000000000000000000000000
450000000000000000000000000
500000000000000000000000000
560000000000000000000000000
630000000000000000000000000
710000000000000000000000000
800000000000000000000000000
900000000000000000000000000
1000000000000000000000000000
1100000000000000000000000000
1250000000000000000000000000
1400000000000000000000000000
1600000000000000000000000000
1800000000000000000000000000
2000000000000000000000000000
2200000000000000000000000000
2500000000000000000000000000
2800000000000000000000000000
3200000000000000000000000000
3600000000000000000000000000
4000000000000000000000000000
4500000000000000000000000000
5000000000000000000000000000
5600000000000000000000000000
6300000000000000000000000000
7100000000000000000000000000
8000000000000000000000000000
9000000000000000000000000000
10000000000000000000000000000
11000000000000000000000000000
12500000000000000000000000000
14000000000000000000000000000
16000000000000000000000000000
18000000000000000000000000000
20000000000000000000000000000
22000000000000000000000000000
25000000000000000000000000000
28000000000000000000000000000
32000000000000000000000000000
36000000000000000000000000000
40000000000000000000000000000
45000000000000000000000000000
50000000000000000000000000000
56000000000000000000000000000
63000000000000000000000000000
71000000000000000000000000000
80000000000000000000000000000
90000000000000000000000000000
100000000000000000000000000000
110000000000000000000000000000
125000000000000000000000000000
140000000000000000000000000000
160000000000000000000000000000
180000000000000000000000000000
200000000000000000000000000000
220000000000000000000000000000
250000000000000000000000000000
280000000000000000000000000000
320000000000000000000000000000
360000000000000000000000000000
400000000000000000000000000000
450000000000000000000000000000
500000000000000000000000000000
560000000000000000000000000000
630000000000000000000000000000
710000000000000000000000000000
800000000000000000000000000000
900000000000000000000000000000
1000000000000000000000000000000
1100000000000000000000000000000
1250000000000000000000000000000
1400000000000000000000000000000
1600000000000000000000000000000
1800000000000000000000000000000
2000000000000000000000000000000
2200000000000000000000000000000
2500000000000000000000000000000
2800000000000000000000000000000
3200000000000000000000000000000
3600000000000000000000000000000
4000000000000000000000000000000
4500000000000000000000000000000
5000000000000000000000000000000
5600000000000000000000000000000
6300000000000000000000000000000
7100000000000000000000000000000
8000000000000000000000000000000
9000000000000000000000000000000
10000000000000000000000000000000
11000000000000000000000000000000
12500000000000000000000000000000
14000000000000000000000000000000
16000000000000000000000000000000
18000000000000000000000000000000
20000000000000000000000000000000
22000000000000000000000000000000
25000000000000000000000000000000
28000000000000000000000000000000
32000000000000000000000000000000
36000000000000000000000000000000
40000000000000000000000000000000
45000000000000000000000000000000
50000000000000000000000000000000
56000000000000000000000000000000
63000000000000000000000000000000
71000000000000000000000000000000
80000000000000000000000000000000
90000000000000000000000000000000
100000000000000000000000000000000
110000000000000000000000000000000
125000000000000000000000000000000
140000000000000000000000000000000
160000000000000000000000000000000
180000000000000000000000000000000
200000000000000000000000000000000
220000000000000000000000000000000
250000000000000000000000000000000
280000000000000000000000000000000
320000000000000000000000000000000
360000000000000000000000000000000
400000000000000000000000000000000
450000000000000000000000000000000
500000000000000000000000000000000
560000000000000000000000000000000
630000000000000000000000000000000
710000000000000000000000000000000
800000000000000000000000000000000
900000000000000000000000000000000
1000000000000000000000000000000000
1100000000000000000000000000000000
1250000000000000000000000000000000
1400000000000000000000000000000000
1600000000000000000000000000000000
1800000000000000000000000000000000
2000000000000000000000000000000000
2200000000000000000000000000000000
2500000000000000000000000000000000
2800000000000000000000000000000000
3200000000000000000000000000000000
3600000000000000000000000000000000
4000000000000000000000000000000000
4500000000000000000000000000000000
5000000000000000000000000000000000
5600000000000000000000000000000000
6300000000000000000000000000000000
7100000000000000000000000000000000
8000000000000000000000000000000000
9000000000000000000000000000000000
10000000000000000000000000000000000
11000000000000000000000000000000000
12500000000000000000000000000000000
14000000000000000000000000000000000
16000000000000000000000000000000000
18000000000000000000000000000000000
20000000000000000000000000000000000
22000000000000000000000000000000000
25000000000000000000000000000000000
28000000000000000000000000000000000
32000000000000000000000000000000000
36000000000000000000000000000000000
40000000000000000000000000000000000
45000000000000000000000000000000000
50000000000000000000000000000000000
56000000000000000000000000000000000
63000000000000000000000000000000000
71000000000000000000000000000000000
80000000000000000000000000000000000
90000000000000000000000000000000000
100000000000000000000000000000000000
110000000000000000000000000000000000
125000000000000000000000000000000000
140000000000000000000000000000000000
160000000000000000000000000000000000
180000000000000000000000000000000000
200000000000000000000000000000000000
220000000000000000000000000000000000
250000000000000000000000000000000000
280000000000000000000000000000000000
320000000000000000000000000000000000
360000000000000000000000000000000000
400000000000000000000000000000000000
450000000000000000000000000000000000
500000000000000000000000000000000000
560000000000000000000000000000000000
630000000000000000000000000000000000
710000000000000000000000000000000000
800000000000000000000000000000000000
900000000000000000000000000000000000
1000000000000000000000000000000000000
1100000000000000000000000000000000000
1250000000000000000000000000000000000
1400000000000000000000000000000000000
1600000000000000000000000000000000000
1800000000000000000000000000000000000
2000000000000000000000000000000000000
2200000000000000000000000000000000000
2500000000000000000000000000000000000
2800000000000000000000000000000000000
3200000000000000000000000000000000000
3600000000000000000000000000000000000
4000000000000000000000000000000000000
4500000000000000000000000000000000000
5000000000000000000000000000000000000
5600000000000000000000000000000000000
6300000000000000000000000000000000000
7100000000000000000000000000000000000
8000000000000000000000000000000000000
9000000000000000000000000000000000000
10000000000000000000000000000000000000
11000000000000000000000000000000000000
12500000000000000000000000000000000000
14000000000000000000000000000000000000
16000000000000000000000000000000000000
18000000000000000000000000000000000000
20000000000000000000000000000000000000
22000000000000000000000000000000000000
25000000000000000000000000000000000000
28000000000000000000000000000000000000
32000000000000000000000000000000000000
36000000000000000000000000000000000000
40000000000000000000000000000000000000
45000000000000000000000000000000000000
50000000000000000000000000000000000000
56000000000000000000000000000000000000
63000000000000000000000000000000000000
71000000000000000000000000000000000000
80000000000000000000000000000000000000
90000000000000000000000000000000000000
100000000000000000000000000000000000000
110000000000000000000000000000000000000
125000000000000000000000000000000000000
140000000000000000000000000000000000000
160000000000000000000000000000000000000
180000000000000000000000000000000000000
200000000000000000000000000000000000000
220000000000000000000000000000000000000
250000000000000000000000000000000000000
280000000000000000000000000000000000000
320000000000000000000000000000000000000
360000000000000000000000000000000000000
400000000000000000000000000000000000000
450000000000000000000000000000000000000
500000000000000000000000000000000000000
560000000000000000000000000000000000000
630000000000000000000000000000000000000
710000000000000000000000000000000000000
800000000000000000000000000000000000000
900000000000000000000000000000000000000
1000000000000000000000000000000000000000
1100000000000000000000000000000000000000
1250000000000000000000000000000000000000
1400000000000000000000000000000000000000
1600000000000000000000000000000000000000
1800000000000000000000000000000000000000
2000000000000000000000000000000000000000
2200000000000000000000000000000000000000
2500000000000000000000000000000000000000
2800000000000000000000000000000000000000
3200000000000000000000000000000000000000
3600000000000000000000000000000000000000
4000000000000000000000000000000000000000
4500000000000000000000000000000000000000
5000000000000000000000000000000000000000
5600000000000000000000000000000000000000
6300000000000000000000000000000000000000
7100000000000000000000000000000000000000
8000000000000000000000000000000000000000
9000000000000000000000000000000000000000
10000000000000000000000000000000000000000
11000000000000000000000000000000000000000
12500000000000000000000000000000000000000
14000000000000000000000000000000000000000
16000000000000000000000000000000000000000
18000000000000000000000000000000000000000
20000000000000000000000000000000000000000
22000000000000000000000000000000000000000
25000000000000000000000000000000000000000
28000000000000000000000000000000000000000
32000000000000000000000000000000000000000
36000000000000000000000000000000000000000
40000000000000000000000000000000000000000
45000000000000000000000000000000000000000
50000000000000000000000000000000000000000
56000000000000000000000000000000000000000
63000000000000000000000000000000000000000
71000000000000000000000000000000000000000
80000000000000000000000000000000000000000
90000000000000000000000000000000000000000
100000000000000000000000000000000000000000
110000000000000000000000000000000000000000
125000000000000000000000000000000000000000
140000000000000000000000000000000000000000
160000000000000000000000000000000000000000
180000000000000000000000000000000000000000
200000000000000000000000000000000000000000
220000000000000000000000000000000000000000
250000000000000000000000000000000000000000
280000000000000000000000000000000000000000
320000000000000000000000000000000000000000
360000000000000000000000000000000000000000
400000000000000000000000000000000000000000
450000000000000000000000000000000000000000
500000000000000000000000000000000000000000
560000000000000000000000000000000000000000
630000000000000000000000000000000000000000
710000000000000000000000000000000000000000
800000000000000000000000000000000000000000
900000000000000000000000000000000000000000
1000000000000000000000000000000000000000000
1100000000000000000000000000000000000000000
1250000000000000000000000000000000000000000
1400000000000000000000000000000000000000000
1600000000000000000000000000000000000000000
1800000000000000000000000000000000000000000
2000000000000000000000000000000000000000000
2200000000000000000000000000000000000000000
2500000000000000000000000000000000000000000
2800000000000000000000000000000000000000000
3200000000000000000000000000000000000000000
3600000000000000000000000000000000000000000
4000000000000000000000000000000000000000000
4500000000000000000000000000000000000000000
5000000000000000000000000000000000000000000
5600000000000000000000000000000000000000000
6300000000000000000000000000000000000000000
7100000000000000000000000000000000000000000
8000000000000000000000000000000000000000000
9000000000000000000000000000000000000000000
10000000000000000000000000000000000000000000
11000000000000000000000000000000000000000000
12500000000000000000000000000000000000000000
14000000000000000000000000000000000000000000
16000000000000000000000000000000000000000000
18000000000000000000000000000000000000000000
20000000000000000000000000000000000000000000
22000000000000000000000000000000000000000000
25000000000000000000000000000000000000000000
28000000000000000000000000000000000000000000
32000000000000000000000000000000000000000000
36000000000000000000000000000000000000000000
40000000000000000000000000000000000000000000
45000000000000000000000000000000000000000000
50000000000000000000000000000000000000000000
56000000000000000000000000000000000000000000
63000000000000000000000000000000000000000000
71000000000000000000000000000000000000000000
80000000000000000000000000000000000000000000
90000000000000000000000000000000000000000000
100000000000000000000000000000000000000000000
110000000000000000000000000000000000000000000
125000000000000000000000000000000000000000000
140000000000000000000000000000000000000000000
160000000000000000000000000000000000000000000
180000000000000000000000000000000000000000000
200000000000000000000000000000000000000000000
220000000000000000000000000000000000000000000
250000000000000000000000000000000000000000000
280000000000000000000000000000000000000000000
320000000000000000000000000000000000000000000
360000000000000000000000000000000000000000000
400000000000000000000000000000000000000000000
450000000000000000000000000000000000000000000
500000000000000000000000000000000000000000000
560000000000000000000000000000000000000000000
630000000000000000000000000000000000000000000
710000000000000000000000000000000000000000000
800000000000000000000000000000000000000000000
900000000000000000000000000000000000000000000
1000000000000000000000000000000000000000000000
1100000000000000000000000000000000000000000000
1250000000000000000000000000000000000000000000
1400000000000000000000000000000000000000000000
1600000000000000000000000000000000000000000000
1800000000000000000000000000000000000000000000
2000000000000000000000000000000000000000000000
2200000000000000000000000000000000000000000000
2500000000000000000000000000000000000000000000
2800000000000000000000000000000000000000000000
3200000000000000000000000000000000000000000000
3600000000000000000000000000000000000000000000
4000000000000000000000000000000000000000000000
4500000000000000000000000000000000000000000000
5000000000000000000000000000000000000000000000
5600000000000000000000000000000000000000000000
6300000000000000000000000000000000000000000000
7100000000000000000000000000000000000000000000
8000000000000000000000000000000000000000000000
9000000000000000000000000000000000000000000000
10000000000000000000000000000000000000000000000
11000000000000000000000000000000000000000000000
12500000000000000000000000000000000000000000000
14000000000000000000000000000000000000000000000
16000000000000000000000000000000000000000000000
18000000000000000000000000000000000000000000000
20000000000000000000000000000000000000000000000
22000000000000000000000000000000000000000000000
25000000000000000000000000000000000000000000000
28000000000000000000000000000000000000000000000
32000000000000000000000000000000000000000000000
36000000000000000000000000000000000000000000000
40000000000000000000000000000000000000000000000
45000000000000000000000000000000000000000000000
50000000000000000000000000000000000000000000000
56000000000000000000000000000000000000000000000
63000000000000000000000000000000000000000000000
71000000000000000000000000000000000000000000000
80000000000000000000000000000000000000000000000
90000000000000000000000000000000000000000000000
100000000000000000000000000000000000000000000000
110000000000000000000000000000000000000000000000
125000000000000000000000000000000000000000000000
140000000000000000000000000000000000000000000000
160000000000000000000000000000000000000000000000
180000000000000000000000000000000000000000000000
200000000000000000000000000000000000000000000000
220000000000000000000000000000000000000000000000
250000000000000000000000000000000000000000000000
280000000000000000000000000000000000000000000000
320000000000000000000000000000000000000000000000
360000000000000000000000000000000000000000000000
400000000000000000000000000000000000000000000000
450000000000000000000000000000000000000000000000
500000000000000000000000000000000000000000000000
560000000000000000000000000000000000000000000000
630000000000000000000000000000000000000000000000
710000000000000000000000000000000000000000000000
800000000000000000000000000000000000000000000000
900000000000000000000000000000000000000000000000
1000000000000000000000000000000000000000000000000
1100000000000000000000000000000000000000000000000
1250000000000000000000000000000000000000000000000
1400000000000000000000000000000000000000000000000
1600000000000000000000000000000000000000000000000
1800000000000000000000000000000000000000000000000
2000000000000000000000000000000000000000000000000
2200000000000000000000000000000000000000000000000
2500000000000000000000000000000000000000000000000
2800000000000000000000000000000000000000000000000
3200000000000000000000000000000000000000000000000
3600000000000000000000000000000000000000000000000
4000000000000000000000000000000000000000000000000
4500000000000000000000000000000000000000000000000
5000000000000000000000000000000000000000000000000
5600000000000000000000000000000000000000000000000
6300000000000000000000000000000000000000000000000
7100000000000000000000000000000000000000000000000
8000000000000000000000000000000000000000000000000
9000000000000000000000000000000000000000000000000
10000000000000000000000000000000000000000000000000
11000000000000000000000000000000000000000000000000
12500000000000000000000000000000000000000000000000
14000000000000000000000000000000000000000000000000
16000000000000000000000000000000000000000000000000
18000000000000000000000000000000000000000000000000
20000000000000000000000000000000000000000000000000
22000000000000000000000000000000000000000000000000
25000000000000000000000000000000000000000000000000
28000000000000000000000000000000000000000000000000
32000000000000000000000000000000000000000000000000
36000000000000000000000000000000000000000000000000
40000000000000000000000000000000000000000000000000
45000000000000000000000000000000000000000000000000
50000000000000000000000000000000000000000000000000
56000000000000000000000000000000000000000000000000
63000000000000000000000000000000000000000000000000
71000000000000000000000000000000000000000000000000
80000000000000000000000000000000000000000000000000
90000000000000000000000000000000000000000000000000
100000000000000000000000000000000000000000000000000
110000000000000000000000000000000000000000000000000
125000000000000000000000000000000000000000000000000
140000000000000000000000000000000000000000000000000
160000000000000000000000000000000000000000000000000
180000000000000000000000000000000000000000000000000
200000000000000000000000000000000000000000000000000
220000000000000000000000000000000000000000000000000
250000000000000000000000000000000000000000000000000
280000000000000000000000000000000000000000000000000
320000000000000000000000000000000000000000000000000
360000000000000000000000000000000000000000000000000
400000000000000000000000000000000000000000000000000
450000000000000000000000000000000000000000000000000
500000000000000000000000000000000000000000000000000
560000000000000000000000000000000000000000000000000
630000000000000000000000000000000000000000000000000
710000000000000000000000000000000000000000000000000
800000000000000000000000000000000000000000000000000
900000000000000000000000000000000000000000000000000
1000000000000000000000000000000000000000000000000000
1100000000000000000000000000000000000000000000000000
1250000000000000000000000000000000000000000000000000
1400000000000000000000000000000000000000000000000000
1600000000000000000000000000000000000000000000000000
1800000000000000000000000000000000000000000000000000
2000000000000000000000000000000000000000000000000000
2200000000000000000000000000000000000000000000000000
2500000000000000000000000000000000000000000000000000
2800000000000000000000000000000000000000000000000000
3200000000000000000000000000000000000000000000000000
3600000000000000000000000000000000000000000000000000
4000000000000000000000000000000000000000000000000000
4500000000000000000000000000000000000000000000000000
5000000000000000000000000000000000000000000000000000
5600000000000000000000000000000000000000000000000000
6300000000000000000000000000000000000000000000000000
7100000000000000000000000000000000000000000000000000
8000000000000000000000000000000000000000000000000000
9000000000000000000000000000000000000000000000000000
10000000000000000000000000000000000000000000000000000
11000000000000000000000000000000000000000000000000000
12500000000000000000000000000000000000000000000000000
14000000000000000000000000000000000000000000000000000
16000000000000000000000000000000000000000000000000000
18000000000000000000000000000000000000000000000000000
20000000000000000000000000000000000000000000000000000
22000000000000000000000000000000000000000000000000000
25000000000000000000000000000000000000000000000000000
28000000000000000000000000000000000000000000000000000
32000000000000000000000000000000000000000000000000000
36000000000000000000000000000000000000000000000000000
40000000000000000000000000000000000000000000000000000
45000000000000000000000000000000000000000000000000000
50000000000000000000000000000000000000000000000000000
56000000000000000000000000000000000000000000000000000
63000000000000000000000000000000000000000000000000000
71000000000000000000000000000000000000000000000000000
80000000000000000000000000000000000000000000000000000
90000000000000000000000000000000000000000000000000000
100000000000000000000000000000000000000000000000000000
110000000000000000000000000000000000000000000000000000
125000000000000000000000000000000000000000000000000000
140000000000000000000000000000000000000000000000000000
160000000000000000000000000000000000000000000000000000
180000000000000000000000000000000000000000000000000000
200000000000000000000000000000000000000000000000000000
220000000000000000000000000000000000000000000000000000
250000000000000000000000000000000000000000000000000000
280000000000000000000000000000000000000000000000000000
320000000000000000000000000000000000000000000000000000
360000000000000000000000000000000000000000000000000000
400000000000000000000000000000000000000000000000000000
450000000000000000000000000000000000000000000000000000
500000000000000000000000000000000000000000000000000000
560000000000000000000000000000000000000000000000000000
630000000000000000000000000000000000000000000000000000
710000000000000000000000000000000000000000000000000000
800000000000000000000000000000000000000000000000000000
900000000000000000000000000000000000000000000000000000
1000000000000000000000000000000000000000000000000000000
1100000000000000000000000000000000000000000000000000000
1250000000000000000000000000000000000000000000000000000
1400000000000000000000000000000000000000000000000000000
1600000000000000000000000000000000000000000000000000000
1800000000000000000000000000000000000000000000000000000
2000000000000000000000000000000000000000000000000000000
2200000000000000000000000000000000000000000000000000000
2500000000000000000000000000000000000000000000000000000
2800000000000000000000000000000000000000000000000000000
3200000000000000000000000000000000000000000000000000000
3600000000000000000000000000000000000000000000000000000
4000000000000000000000000000000000000000000000000000000
4500000000000000000000000000000000000000000000000000000
5000000000000000000000000000000000000000000000000000000
5600000000000000000000000000000000000000000000000000000
6300000000000000000000000000000000000000000000000000000
7100000000000000000000000000000000000000000000000000000
8000000000000000000000000000000000000000000000000000000
9000000000000000000000000000000000000000000000000000000
10000000000000000000000000000000000000000000000000000000
11000000000000000000000000000000000000000000000000000000
12500000000000000000000000000000000000000000000000000000
14000000000000000000000000000000000000000000000000000000
16000000000000000000000000000000000000000000000000000000
18000000000000000000000000000000000000000000000000000000
20000000000000000000000000000000000000000000000000000000
22000000000000000000000000000000000000000000000000000000
25000000000000000000000000000000000000000000000000000000
28000000000000000000000000000000000000000000000000000000
32000000000000000000000000000000000000000000000000000000
36000000000000000000000000000000000000000000000000000000
40000000000000000000000000000000000000000000000000000000
45000000000000000000000000000000000000000000000000000000
50000000000000000000000000000000000000000000000000000000
56000000000000000000000000000000000000000000000000000000
63000000000000000000000000000000000000000000000000000000
71000000000000000000000000000000000000000000000000000000
80000000000000000000000000000000000000000000000000000000
90000000000000000000000000000000000000000000000000000000
100000000000000000000000000000000000000000000000000000000
110000000000000000000000000000000000000000000000000000000
125000000000000000000000000000000000000000000000000000000
140000000000000000000000000000000000000000000000000000000
160000000000000000000000000000000000000000000000000000000
180000000000000000000000000000000000000000000000000000000
200000000000000000000000000000000000000000000000000000000
220000000000000000000000000000000000000000000000000000000
250000000000000000000000000000000000000000000000000000000
280000000000000000000000000000000000000000000000000000000
320000000000000000000000000000000000000000000000000000000
360000000000000000000000000000000000000000000000000000000
400000000000000000000000000000000000000000000000000000000
450000000000000000000000000000000000000000000000000000000
500000000000000000000000000000000000000000000000000000000
560000000000000000000000000000000000000000000000000000000
630000000000000000000000000000000000000000000000000000000
710000000000000000000000000000000000000000000000000000000
800000000000000000000000000000000000000000000000000000000
900000000000000000000000000000000000000000000000000000000
1000000000000000000000000000000000000000000000000000000000
1100000000000000000000000000000000000000000000000000000000
1250000000000000000000000000000000000000000000000000000000
1400000000000000000000000000000000000000000000000000000000
1600000000000000000000000000000000000000000000000000000000
1800000000000000000000000000000000000000000000000000000000
2000000000000000000000000000000000000000000000000000000000
2200000000000000000000000000000000000000000000000000000000
2500000000000000000000000000000000000000000000000000000000
2800000000000000000000000000000000000000000000000000000000
3200000000000000000000000000000000000000000000000000000000
3600000000000000000000000000000000000000000000000000000000
4000000000000000000000000000000000000000000000000000000000
4500000000000000000000000000000000000000000000000000000000
5000000000000000000000000000000000000000000000000000000000
5600000000000000000000000000000000000000000000000000000000
6300000000000000000000000000000000000000000000000000000000
7100000000000000000000000000000000000000000000000000000000
8000000000000000000000000000000000000000000000000000000000
9000000000000000000000000000000000000000000000000000000000
10000000000000000000000000000000000000000000000000000000000
11000000000000000000000000000000000000000000000000000000000
12500000000000000000000000000000000000000000000000000000000
14000000000000000000000000000000000000000000000000000000000
16000000000000000000000000000000000000000000000000000000000
18000000000000000000000000000000000000000000000000000000000
20000000000000000000000000000000000000000000000000000000000
22000000000000000000000000000000000000000000000000000000000
25000000000000000000000000000000000000000000000000000000000
28000000000000000000000000000000000000000000000000000000000
32000000000000000000000000000000000000000000000000000000000
36000000000000000000000000000000000000000000000000000000000
40000000000000000000000000000000000000000000000000000000000
45000000000000000000000000000000000000000000000000000000000
50000000000000000000000000000000000000000000000000000000000
56000000000000000000000000000000000000000000000000000000000
63000000000000000000000000000000000000000000000000000000000
71000000000000000000000000000000000000000000000000000000000
80000000000000000000000000000000000000000000000000000000000
90000000000000000000000000000000000000000000000000000000000
100000000000000000000000000000000000000000000000000000000000
110000000000000000000000000000000000000000000000000000000000
125000000000000000000000000000000000000000000000000000000000
140000000000000000000000000000000000000000000000000000000000
160000000000000000000000000000000000000000000000000000000000
180000000000000000000000000000000000000000000000000000000000
200000000000000000000000000000000000000000000000000000000000
220000000000000000000000000000000000000000000000000000000000
250000000000000000000000000000000000000000000000000000000000
280000000000000000000000000000000000000000000000000000000000
320000000000000000000000000000000000000000000000000000000000
360000000000000000000000000000000000000000000000000000000000
400000000000000000000000000000000000000000000000000000000000
450000000000000000000000000000000000000000000000000000000000
500000000000000000000000000000000000000000000000000000000000
560000000000000000000000000000000000000000000000000000000000
630000000000000000000000000000000000000000000000000000000000
710000000000000000000000000000000000000000000000000000000000
800000000000000000000000000000000000000000000000000000000000
900000000000000000000000000000000000000000000000000000000000
1000000000000000000000000000000000000000000000000000000000000
1100000000000000000000000000000000000000000000000000000000000
1250000000000000000000000000000000000000000000000000000000000
1400000000000000000000000000000000000000000000000000000000000
1600000000000000000000000000000000000000000000000000000000000
1800000000000000000000000000000000000000000000000000000000000
2000000000000000000000000000000000000000000000000000000000000
2200000000000000000000000000000000000000000000000000000000000
2500000000000000000000000000000000000000000000000000000000000
2800000000000000000000000000000000000000000000000000000000000
3200000000000000000000000000000000000000000000000000000000000
3600000000000000000000000000000000000000000000000000000000000
4000000000000000000000000000000000000000000000000000000000000
4500000000000000000000000000000000000000000000000000000000000
5000000000000000000000000000000000000000000000000000000000000
5600000000000000000000000000000000000000000000000000000000000
6300000000000000000000000000000000000000000000000000000000000
7100000000000000000000000000000000000000000000000000000000000
8000000000000000000000000000000000000000000000000000000000000
9000000000000000000000000000000000000000000000000000000000000
10000000000000000000000000000000000000000000000000000000000000
11000000000000000000000000000000000000000000000000000000000000
12500000000000000000000000000000000000000000000000000000000000
14000000000000000000000000000000000000000000000000000000000000
16000000000000000000000000000000000000000000000000000000000000
18000000000000000000000000000000000000000000000000000000000000
20000000000000000000000000000000000000000000000000000000000000
22000000000000000000000000000000000000000000000000000000000000
25000000000000000000000000000000000000000000000000000000000000
28000000000000000000000000000000000000000000000000000000000000
32000000000000000000000000000000000000000000000000000000000000
36000000000000000000000000000000000000000000000000000000000000
40000000000000000000000000000000000000000000000000000000000000
45000000000000000000000000000000000000000000000000000000000000
50000000000000000000000000000000000000000000000000000000000000
56000000000000000000000000000000000000000000000000000000000000
63000000000000000000000000000000000000000000000000000000000000
71000000000000000000000000000000000000000000000000000000000000
80000000000000000000000000000000000000000000000000000000000000
90000000000000000000000000000000000000000000000000000000000000
100000000000000000000000000000000000000000000000000000000000000
110000000000000000000000000000000000000000000000000000000000000
125000000000000000000000000000000000000000000000000000000000000
140000000000000000000000000000000000000000000000000000000000000
160000000000000000000000000000000000000000000000000000000000000
180000000000000000000000000000000000000000000000000000000000000
200000000000000000000000000000000000000000000000000000000000000
220000000000000000000000000000000000000000000000000000000000000
250000000000000000000000000000000000000000000000000000000000000
280000000000000000000000000000000000000000000000000000000000000
320000000000000000000000000000000000000000000000000000000000000
360000000000000000000000000000000000000000000000000000000000000
400000000000000000000000000000000000000000000000000000000000000
450000000000000000000000000000000000000000000000000000000000000
500000000000000000000000000000000000000000000000000000000000000
560000000000000000000000000000000000000000000000000000000000000
630000000000000000000000000000000000000000000000000000000000000
710000000000000000000000000000000000000000000000000000000000000
800000000000000000000000000000000000000000000000000000000000000
900000000000000000000000000000000000000000000000000000000000000
1000000000000000000000000000000000000000000000000000000000000000
1100000000000000000000000000000000000000000000000000000000000000
1250000000000000000000000000000000000000000000000000000000000000
1400000000000000000000000000000000000000000000000000000000000000
1600000000000000000000000000000000000000000000000000000000000000
1800000000000000000000000000000000000000000000000000000000000000
2000000000000000000000000000000000000000000000000000000000000000
2200000000000000000000000000000000000000000000000000000000000000
2500000000000000000000000000000000000000000000000000000000000000
2800000000000000000000000000000000000000000000000000000000000000
3200000000000000000000000000000000000000000000000000000000000000
3600000000000000000000000000000000000000000000000000000000000000
4000000000000000000000000000000000000000000000000000000000000000
4500000000000000000000000000000000000000000000000000000000000000
5000000000000000000000000000000000000000000000000000000000000000
5600000000000000000000000000000000000000000000000000000000000000
6300000000000000000000000000000000000000000000000000000000000000
7100000000000000000000000000000000000000000000000000000000000000
8000000000000000000000000000000000000000000000000000000000000000
9000000000000000000000000000000000000000000000000000000000000000
10000000000000000000000000000000000000000000000000000000000000000
11000000000000000000000000000000000000000000000000000000000000000
12500000000000000000000000000000000000000000000000000000000000000
14000000000000000000000000000000000000000000000000000000000000000
16000000000000000000000000000000000000000000000000000000000000000
18000000000000000000000000000000000000000000000000000000000000000
20000000000000000000000000000000000000000000000000000000000000000
22000000000000000000000000000000000000000000000000000000000000000
25000000000000000000000000000000000000000000000000000000000000000
28000000000000000000000000000000000000000000000000000000000000000
32000000000000000000000000000000000000000000000000000000000000000
36000000000000000000000000000000000000000000000000000000000000000
40000000000000000000000000000000000000000000000000000000000000000
45000000000000000000000000000000000000000000000000000000000000000
50

CIHM/ICMH
Microfiche
Series.

CIHM/ICMH
Collection de
microfiches.

Canadian Institute for Historical Microreproductions / Institut canadien de microreproductions historiques

© 1981

Technical and Bibliographic Notes/Notes techniques et bibliographiques

The Institute has attempted to obtain the best original copy available for filming. Features of this copy which may be bibliographically unique, which may alter any of the images in the reproduction, or which may significantly change the usual method of filming, are checked below.

- ☐ Coloured covers/ Couverture de couleur
- ☐ Covers damaged/ Couverture endommagée
- ☐ Covers restored and/or laminated/ Couverture restaurée et/ou pelliculée
- ☐ Cover title missing/ Le titre de couverture manque
- ☐ Coloured maps/ Cartes géographiques en couleur
- ☐ Coloured ink (i.e. other than blue or black)/ Encre de couleur (i.e. autre que bleue ou noire)
- ☐ Coloured plates and/or illustrations/ Planches et/ou illustrations en couleur
- ☐ Bound with other material/ Relié avec d'autres documents
- ☐ Tight binding may cause shadows or distortion along interior margin/ La reliure serrée peut causer de l'ombre ou de la distortion le long de la marge intérieure
- ☐ Blank leaves added during restoration may appear within the text. Whenever possible, these have been omitted from filming/ Il se peut que certaines pages blanches ajoutées lors d'une restauration apparaissent dans le texte, mais, lorsque cela était possible, ces pages n'ont pas été filmées.
- ☐ Additional comments:/ Commentaires supplémentaires:

L'Institut a microfilmé le meilleur exemplaire qu'il lui a été possible de se procurer. Les détails de cet exemplaire qui sont peut-être uniques du point de vue bibliographique, qui peuvent modifier une image reproduite, ou qui peuvent exiger une modification dans la méthode normale de filmage sont indiqués ci-dessous.

- ☐ Coloured pages/ Pages de couleur
- ☐ Pages damaged/ Pages endommagées
- ☐ Pages restored and/or laminated/ Pages restaurées et/ou pelliculées
- ☑ Pages discoloured, stained or foxed/ Pages décolorées, tachetées ou piquées
- ☐ Pages detached/ Pages détachées
- ☑ Showthrough/ Transparence
- ☐ Quality of print varies/ Qualité inégale de l'impression
- ☐ Includes supplementary material/ Comprend du matériel supplémentaire
- ☐ Only edition available/ Seule édition disponible
- ☐ Pages wholly or partially obscured by errata slips, tissues, etc., have been refilmed to ensure the best possible image/ Les pages totalement ou partiellement obscurcies par un feuillet d'errata, une pelure, etc., ont été filmées à nouveau de façon à obtenir la meilleure image possible.

This item is filmed at the reduction ratio checked below/
Ce document est filmé au taux de réduction indiqué ci-dessous.

10X	12X	14X	16X	18X	20X	22X	24X	26X	28X	30X	32X
				✓							

The copy filmed here has been reproduced thanks tc the generosity of:

Library of the Public
Archives of Canada

The images appearing here are the best quality possible considering the condition and legibility of the original copy and in keeping with the filming contract specifications.

Original copies in printed paper covers are filmed beginning with the front cover and ending on the last page with a printed or illustrated impression, or the back cover when appropriate. All other original copies are filmed beginning on the first page with a printed or illustrated impression, and ending on the last page with a printed or illustrated impression.

The last recorded frame on each microfiche shall contain the symbol → (meaning "CONTINUED"), or the symbol ∇ (meaning "END"), whichaver applies.

Maps, plates, charts, etc., may be filmed at different reduction ratios. Those too large to be entirely included in one exposure are filmed beginning in the upper left hand corner, left to right and top to bottom, as many frames as required. The following diagrams illustrate the method:

L'exemplaire filmé fut reproduit grâce à la générosité de:

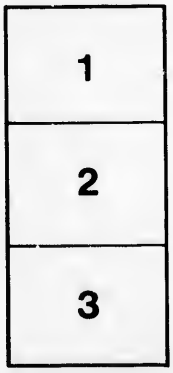
La bibliothèque des Archives
publiques du Canada

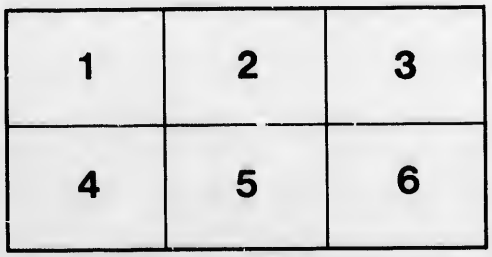
Les images suivantes ont été reproduites avec le plus grand soin, compte tenu de la condition et de la netteté de l'exemplaire filmé, et en conformité avec les conditions du contrat de filmage.

Les exemplaires originaux dont la couverture en papier est imprimée sont filmés en commençant par le premier plat et en terminant soit par la dernière page qui comporte une empreinte d'impression ou d'illustration, soit par le second plat, selon le cas. Tous les autres exemplaires originaux sont filmés en commençant par la première page qui comporte une empreinte d'impression ou d'illustration et en terminant par la dernière page qui comporte une telle empreinte.

Un des symboles suivants apparaîtra sur la dernière image de chaque microfiche, selon le cas: le symbole → signifie "A SUIVRE", le symbole ∇ signifie "FIN".

Les cartes, planches, tableaux, etc., peuvent être filmés à des taux de réduction différents. Lorsque le document est trop grand pour être reproduit en un seul cliché, il est filmé à partir de l'angle supérieur gauche, de gauche à droite, et de haut en bas, en prenant le nombre d'images nécessaire. Les diagrammes suivants illustrent la méthode.





W

TRE

REE

L

Bruno Horse Pamphlets

THE

WOODS AND MINERALS

OF

NEW BRUNSWICK,

BEING A

DESCRIPTIVE CATALOGUE

OF THE

TREES, SHRUBS, ROCKS AND MINERALS OF THE PROVINCE, AVAILABLE FOR ECONOMIC PURPOSES.

PREPARED FOR USE AT THE CENTENNIAL EXHIBITION AT PHILADELPHIA IN 1876.

BY

L. W. BAILEY, Ph. D., Prof. of Natural History in the University of New Brunswick,

AND

EDWARD JACK, Esq., C. E., Surveyor of Crown Lands.

FREDERICTON, N. B.,
1876.

Printed at the DAILY TELEGRAPH STEAM JOB ROOMS, Saint John, N. B.

INTRODUCTION,

In explanation of the peculiar features and method of treatment in the following work, the authors feel it but right that a few words should here be said as to the circumstances in which it originated. The immediate cause of its preparation was a resolution on the part of the New Brunswick Advisory Board of the Canadian Commission for the Centennial Exhibition at Philadelphia, that the Province should, among other things, be represented at that exhibition by a collection of its native woods, particularly such as are of economic importance, and the desirability, if not necessity, which existed that such collection should be accompanied by a properly arranged Descriptive Catalogue. In attempting, however, to prepare such a catalogue, the authors could not but be impressed by the favorable opportunity offered of preparing something which should serve more than a transient purpose, and which, by giving full particulars of the articles referred to, their mode of occurrence, their abundance, the facilities with which they could be obtained and other like facts, would thus acquire a permanent value, in as well as beyond our own limits. This object they have accordingly held prominently in view in the preparation of the following pages, the description of each article referred to being as complete as was possible with the very limited time at their disposal. Though necessarily compiled in part from pre-existing publications (among which may be mentioned Perley's Handbook of New Brunswick, and especially the admirable Report of Dr. Geo. B. Emerson on the Trees and Shrubs of Massachusetts) they have, as far as possible, endeavored to make the work original, and peculiar in its applications to New Brunswick, the statements made being in most instances based upon the personal observations of the authors, or obtained from the most recent and reliable sources. In that portion of the work which refers to the Woods and Shrubs of New Brunswick, special attention has been given to such as are employed for ship-building and

for export, more particularly as regards the present cost and facilities for their production, and it is believed that the facts thus stated, being based upon reliable observations, may be of much service to those interested in these important pursuits. By calling attention to the possibility of a more extended cultivation of certain plants such as now grow only spontaneously, or suggesting possible applications of woods now restricted to only a few uses, they trust that efforts may be directed into channels which, if intelligently and persistently pursued, cannot fail to be productive of important results.

It should be added that the statistics of Mines and Minerals were collected by one of the authors in connection with the Geological Survey of Canada, and are here reproduced, by the consent of the Director of the Survey, from a Report addressed to the latter.

TREES AND SHRUBS

OF

NEW BRUNSWICK.

NOTE.—The order of arrangement adopted in the description of the following plants is based upon their relationship according to the Natural System, and not upon their relative economic value.

CHAPTER I.

DIVISION I.

PLANTS WITH COVERED SEEDS—*Angiospermæ*,

LINDEN FAMILY—(*Tiliaceæ*)

BASS-WOOD, OR LIME TREE, (*Tilia Americana-L.*)

Though rare there are few more striking trees in the New Brunswick woods than the Bass-wood, or American Linden. With a tall straight and somewhat columnar trunk, sometimes as much as 80 feet in height, branching freely, and densely clothed with rich green foliage, diversified in the season by its abundant yellowish-green flowers, or nut-like fruit, it can hardly fail to attract attention, and merely as an ornamental tree is well worthy of cultivation. Its wood is also of considerable value, being soft, white, and of a fine close grain. It is also very tough and pliable, and being less liable to split than other woods from varying extremes of temperature, is here used, in preference to all others, for the making of the curved fronts of sleighs, panels of carriages, &c. For similar reasons it is used by stair-builders for the carved ends of stairs, and for interior finishing. It is readily carved and turned, and has sometimes been employed for the figure-heads of vessels.

Its inner bark, or *liber*, is tough and fibrous and is well adapted for the manufacture of rough ropes and cords.

CASHEW FAMILY—(*Anacardiaceæ.*)

The Sumach, (*Rhus typhina–L.*)

This shrub or small tree, readily distinguished by its pinnate leaves and conspicuous scarlet or purple fruit, though not an abundant tree is yet not uncommon, being met with, particularly in intervale lands and along the banks of streams, in nearly all parts of the Province. It is often cultivated for ornamental purposes, and as borders for fields or gardens. Its chief economic value is derived from its bark and leaves, which are available for tanning. It is abundant in the Nerepis region, but rare upon the coast.

The Poison Ivy, (*Rhus Toxicodendron–L.*)

This species is mentioned here rather as a plant to be avoided than as one worthy of cultivation, its poisonous qualities being such as to render it a dangerous neighbor to farms or dwellings. Fortunately, although common at some points, it appears not to be very widely distributed, specimens having been observed at but few localities within the Province. It rarely stands alone, being usually found spreading over rocks or climbing trees, being attached by small rootlets in much the same way as the true or English Ivy. It is readily distinguished in autumn by its bright red leaves.

VINE FAMILY—(*Vitaceæ.*)

But one species of Vine grows wild in New Brunswick, namely the Northern Fox Grape or *Vitis Labrusca L.* It is the species from which, by cultivation, the much prized Isabella grape has been derived, but in its wild state, though possessing a pleasant flavor, it is greatly injured by a tough skin, and a large, hard and somewhat acid pulp. Even in this latter form, however, it may be advantageously employed in the manufacture of wine, yielding a product possessing an agreable sub-acid flavor.

THE SOAP-BERRY FAMILY—(*Sapindaceæ.*)

The representatives of this family in New Brunswick belong to two sub-orders, of which the first (*Sapindaceæ proper*) is rep-

resented by the introduced Horse-chestnut, much prized as an ornamental tree; and the second (*Acerineæ*) by the different species of Maples. The latter only require notice here.

STRIPED MAPLE, (*Acer Pennsylvanicum–L.*)

This small and slender tree, often also called Striped Dogwood and Moose-wood, and readily recognized by its light green bark, striped with dark lines, and its large greenish but showy fruit, is quite common in New Brunswick, growing usually in rich woods, and beneath the shade of taller trees. As signified by one of its names, it is the favorite food of the Moose, by which it is often completely stripped of its tender bark and branches. It is little used even as an ornamental tree, though possessing considerable beauty, and improving under cultivation. It rarely exceeds a height of fifteen or twenty feet.

MOUNTAIN MAPLE, (*Acer spicatum–Lam.*)

This is a shrubby species, rarely attaining the height of a true tree, and is only interesting as sharing in common with the other maples considerable beauty in its autumnal foliage, though inferior in this respect to the three following species. It usually grows in clumps, in rocky but somewhat moist situations, and sometimes reaches a height of fifteen or twenty feet.

WHITE OR SILVER MAPLE, (*Acer dasycarpum–Ehr.*)

This is a somewhat smaller tree than the Rock Maple, and less generally distributed, being apparently wanting in the northern counties, and elsewhere confined to the borders of streams. It is not uncommon among the creeks and islands of the St. John river, and is often a tree of considerable size and beauty. It yields a soft white wood, fine grained and readily worked, but with little strength or durability. It is rarely used except in the manufacture of agricultural implements.

RED OR SWAMP MAPLE, (*Acer rubrum–L.*)

This tree is, among the maples, second only to the Rock Maple in size and in the value of its wood. Though not strictly confined to swamps, it flourishes best in low wooded swales, and where there is abundant moisture; attaining, sometimes, under these circumstances, a height of sixty or seventy feet. It has

been observed in all parts of the Province, being readily recognizable in spring, from the reddish or crimson color of its recent shoots, and in autumn from the intense brilliancy of its variegated foliage.

"The wood of the Red Maple is whitish, with a tint of rose-color, of a fine and close grain, compact, firm and smooth, the silver grain lying in layers very narrow and close, and the pores being very small. It is well suited for turning, and takes a fine polish; is easily wrought and serves for a great variety of purposes. It is much used for common bedsteads, tables, chairs, bureaus, and other cheap furniture. In building it serves well for joists, is an excellent material for flooring, and may be used for any part not exposed to dampness. It lasts well in the flat of a ship's floor. It has sufficient elasticity to serve to be made into oars, which are almost equal to those of white ash. Its defects are want of strength, and its speedy decay when alternately exposed to moisture and dryness."

Rock or Sugar Maple, (*Acer Saccharinum-Wang.*)

This is the largest and finest of the Maples as it is the most valuable in its economic applications. Though varying greatly in aspect according to the special conditions under which it has grown, it is in all cases a remarkable and sometimes even a majestic tree, beautiful alike for form and foliage, the contour of the leaf being remarkably graceful. It is partial to rich deep and gravelly loams, and, except directly along the sea board, is a very common upland tree throughout the Province. Its ordinary height is about fifty or sixty feet, though rising, sometimes, to as much as seventy or eighty.

It is of rapid growth and capable of ready cultivation, but when in open ground and unprotected is rather readily overthrown and subject to somewhat premature decay. "For the purposes of art," says Emerson, "no native wood possesses more beauty "or a greater variety of appearance than that of the Rock Maple. "It is hard, close-grained, smooth and compact, and capable of "taking and retaining an exquisite polish. The straight-grained "or common variety has a resemblance to satin wood but is of "a deeper color. The variety called Curled Hard Maple, which

"is caused by the sinuous course of the fibres, gives a change-
"able surface of alternate light and shade, exhibiting an agree-
"able and striking play of colors. But the most remarkable
"variety is the Birds'-eye Maple. This is so called from a
"contortion of the fibres at irregular intervals, throwing out a
"variable point of light, and giving an appearance of a roundish
"projection rising from within a slight cavity, and bearing a
"distant resemblance to the eye of a bird. All the varieties,
"particularly the last, are used in the manufacture of articles
"of furniture—wardrobes, chairs, bed-steads, bureaus, portable
"desks, frames of pictures, &c. The straight-grained variety is
"much used in the manufacture of buckets and tubs, and is pre-
"ferable to every other wood for the making of lasts. In naval
"architecture the Rock Maple furnishes the best material, next
"to white oak, for the keel, and by some persons it is preferred
"for that purpose."

Rock Maple grows in great abundance on the Saint John River and its branches. It is found in greatest quantities commencing between Fredericton and Woodstock and extending to the Northern boundary line of the Province. In the district North of the Tobique, for more than forty miles in a straight line, the explorer can travel through extremely fertile lands, the growth on which is very largely composed of this tree, without meeting the habitation of man. A large quantity of sugar and some molasses or treacle is yearly made in the months of March and April, from the Maple sap which is received in troughs, holes having been bored or cut in the trunks of the trees to which a small spout is attached. The liquid is boiled down in large iron pots to the required thickness and then sugared off, as it is called among sugar makers. A very agreeable candy is made by pouring the sap when boiled to the proper consistency suddenly on snow. This candy can be made in summer from the sugar by boiling it down with a little water and using ice instead of snow as a means of sudden cooling.

The French, of the County of Madawaska, are the largest manufacturers of this sugar, and there is but little other used in that County. In the bright warm April days the careful observer may frequently notice the common squirrel hanging tena-

ciously to some maple twig, occasionally lifting his head to bark angrily at the intruder. Closer observation will reveal the fact that the noisy climber is regaling himself on the delicious sap which the approach of spring is sending from the root to the branches of the tree. Many of the Provincial railroads pass through or near extensive forests of this wood, but, although small water-powers abound, no establishments for its manufacture for the various purposes of commerce have, as yet, been erected.

An important application of Maple wood, especially of Birds'-eye Maple, in veneers, has recently been made in the internal decoration of railway carriages, for which it is admirably adapted. Although, like other Maples, it is deficient in durability under exposure, it is very strong and remarkably cohesive.

As fuel its value is unequalled by that of any other tree in New Brunswick, and very large quantities are annually consumed for this purpose.

THE ROSE FAMILY—(*Rosaceæ.*)

The members of this family deserving mention here, embrace a number of trees mostly related to the Plum and Cherry, the Roses, the Thorns, the Choke Berry, Mountain Ash and Shadbush, together with a number of low Shrubs or Vines, interesting chiefly as a source of edible fruit.

Wild Yellow or Red Plum, (*Prunus Americana–Marsh.*)

This plant, forming a small and somewhat thorny tree or sometimes only a high bush, has been employed as a hedge in some portions of York County, but has not been observed elsewhere. In the Northern parts of New England it is often cultivated for its fruit, which is pleasant though somewhat sharp and covered with a tough skin. It is said to improve greatly under culture.

Dwarf Cherry, (*Prunus pumila–L.*)

This is a small depressed and trailing shrub, varying from six to eighteen inches in height. It is common along the sandy and gravelly banks of the St. John River and its larger tribu-

taries, such as the Kennebecasis, but possesses no economic interest.

WILD RED CHERRY, (*Prunus Pennsylvanica–L.*)

This is a very common species throughout the Province. It is a tree from twenty to thirty feet in height, yielding an abundant but small and sourish fruit. It commonly occurs in low grounds and in rocky woods; also, and especially, in newly burnt clearings. It is of too small size to be of value.

CHOKE CHERRY, (*Prunus Virginiana*–L.)

This is a tall shrub rather than a tree, deriving its common appellation from the peculiarly astringent and somewhat dangerous character of its fruit, especially before the latter has completely matured. It is common along river banks throughout the Province.

WILD BLACK CHERRY, (*Prunus serotina Ehr.*)

This is a larger, but a much less common tree in New Brunswick than the other species of *Prunus* previously described. It has been observed about Fredericton and (by Rev. J. Fowler) on the Salmon River in Kent, but it is in both instances rare, while near the coast it has been observed in one instance only. Though found in various situations, it is said to prefer a dry soil, and under favorable circumstances may attain a height of thirty feet or more.

"The wood of the wild Black Cherry is of a light red or fresh mahogany color, growing darker and richer with age. The medullary rays, or what are commonly called the silver grain, are very numerous and more closely arranged than in almost any other kind of wood, and when cut by a plane, not quite parallel to them, exhibit a beautiful appearance. It is very close-grained, compact, takes a good polish, and, when perfectly seasoned, is not liable to shrink or warp. It is therefore particularly suitable and much employed for tables, chests of drawers and other cabinet work, and when polished and varnished is not less beautiful for such articles than inferior kinds of mahogany. It is particularly valuable for window sashes, as it retains a permanently smooth surface and is little affected by the weather. In some places it is used to make the posts of

stair-rails and for doors, in which it looks extremely well. Gun-stocks and other small articles are also made of it. The most beautiful portion, commonly used, is that portion of the trunk where the branches begin. This part is often equal to the better kinds of mahogany. It would be worth the experiment to manufacture that part of the trunk which is beneath the surface of the ground. It might be found as beautiful as the roots of the black and yellow birch."—*Emerson.*

The fruit of the Black Cherry has a pleasant vinous flavor, though somewhat bitter. It is much liked by the birds and it is suggested that its employment along the borders of orchards would thus serve to protect more valuable fruit. Its juice may be advantageously used in the flavoring of alcoholic liquids and extracts.

English Hawthorn, (*Cratægus Oxyeantha–L.*)

This is an introduced species, but has become readily naturalized in many parts of the Province, being frequently employed as a hedge, for which it is admirably adapted, both by its mode of growth, its thorny character, and the beauty in autumn of its scarlet berries.

The wood of this, as of the other species of thorn, is hard, close grained and heavy, but difficult to work and of small size, and hence but little used except for small articles, such as the handles of tools, &c. It is said to receive readily the grafts of pears and other fruits of its own family.

Scarlet Fruited Thorn, (*Cratægus coccinea–L.*)

A showy species, like the last, common in thickets and on rocky banks, forming a low tree. It is sometimes called the White Thorn.

Black or Pear Thorn, (*Cratægus tomentosa, var. punctata.*)

This plant is common along the banks of streams in the central and eastern parts of the Province, and is well fitted for hedging, though rarely used. It is usually from eight to ten feet high, though capable of rising to twenty feet. Its fruit is dull red and yellowish, with whitish dots.

CHOKE BERRY, (*Pyrus arbutifolia–L.*)

This is a common plant in the Province, not only in the interior but in St. John county, where it is often met with in the rocky barrens along the coast. It is here represented by its finest variety, (*var. melanocarpa*) characterized by its smoothness and shining black fruit, but is a shrub of small size and little value.

AMERICAN MOUNTAIN ASH, (*Pyrus Americana–D C.*)

This plant is not uncommon throughout the Province, both in the wild state and in cultivation, where it is highly prized for the ornamental character of its scarlet fruit. It favours low, cold and moist ground, but is found in almost all situations, attaining a height of from fifteen to twenty feet. It often receives the name of its European relative the Rowan-tree, but is of more slender habit. Its berries are bitter and sourish to the taste, but may be advantageously employed as a source of malic acid. The infusion of the bark is used frequently by lumbermen as a remedy for feverish colds.

MAY CHERRY, SHAD BUSH OR SERVICE BERRY, (*Amelanchier Canadensis, Tor. and Gray.*)

This species is represented in New Brunswick by three well-marked varieties, agreeing in the character of their fruit, but differing both in size and in the characteristics of their foliage. Of these the first (*var. Botryapium*) is a tree, from ten to thirty feet in height, very common in dry woods throughout the Province; the second (*var. oblongifolia*) is smaller and of less frequent occurrence, but still not rare, especially in barren land; while the third (*var. oligocarpa*) is a shrub confined mostly to swamps. They are all more or less ornamental, and would doubtless improve greatly under cultivation.

The berry bearing shrubs and vines belonging to this family, and yielding more or less edible fruits, are the Strawberry, (*Fragaria vesca L.* and *F. Virginiana* Ehr, the latter the common Strawberry,) the Cloudberry (*Rubus Chamæmorus L.*); the Dwarf Raspberry, (*Rubus triflorus R.*); the Wild Red Raspberry, (*R. strigosus* Michx.;) the common or High Blackberry, *R. villosus* Ait.); the Low Blackberry or Dewberry, (*R. Cana-*

densis–L.); and the Running Swamp Blackberry, (*R. hispidus L.*). Of these, by far the most abundant as well as the most valuable are the common strawberry and the raspberry, which abound in all parts of the Province, and especially about newly cleared settlements. The Cloudberry is much less common, but is still a choice fruit, and along the coast, where it flourishes in peat-bogs and to which it appears to be confined, it is highly prized under the name of Bake-apple by the fishermen and others, for the making of preserves. The fruit, both of the high and low blackberry, is delicious, but they are far less abundant in New Brunswick than the species first named.

Three species of Rose grow wild in New Brunswick, in addition to the Sweet Brier, which is common under cultivation. These are the Swamp Rose, (*Rosa Carolina–L.*); the Dwarf Wild Rose, (*Rosa lucida* Ehr.); and the Early Wild Rose, (*Rosa blanda Ait.*) They are common, especially the last, in low grounds, upon intervales and islands, and are valued for their beauty, but possess no economic interest.

THE CURRANT FAMILY—(*Grossulaceæ.*)

This family embraces only a single genus (*Ribes*), of shrubby plants, including the Currants and Gooseberries. There are six species, the first the Wild or Prickly Gooseberry, (*R. Cynosbati–L.*); the second the Smooth Wild Gooseberry, (*R. hirtetlum* Michx,) common in woods throughout the Province; the Swamp Gooseberry, (*R. lacustre* Poir,) also common; the Fetid Currant, (*R. prostratum L'Her,*; the Wild Black Currant, (*R, floridum*;) and the Red Currant, (*R. rubrum.*). The latter is the same as the Red Currant of the gardens, but smaller than the cultivated variety.

THE WITCH-HAZEL FAMILY—(*Hamamelaceæ.*)

This is represented by a single species only, the Witch-Hazel, (*Hamamelis Virginica–L.*) It is a tall shrub, peculiar for its late blossoming, and has been observed, though not abundantly, in several parts of York, Kings and Kent counties. Its gaudy yellow flowers, appearing at the same time that the leaves are falling, making it a conspicuous ornament of the autumnal

woods, and one well worthy of cultivation. Its wood is "white, flexible, and of a fine close texture."

THE DOGWOOD FAMILY—(*Cornaceæ.*)

The members of this family in New Brunswick are the Dwarf Cornel or Bunch Berry, (*Cornus Canadensis,*) a vine abundant everywhere, and conspicuous alike for its showy blossoms and scarlet bunch-like, but scarcely edible fruit; the Red Osier Dogwood, (*C. stolonifera* Michx,) also common, and, by its mode of propagation through stolons or prostrate stems, often forming dense clumps; the Panicled Cornel (*C. paniculata L'Her,*) a branching shrub from four to eight feet high, but less common than the foregoing species, and the Alternate leaved Cornel, (*C. alterni folia*–L). The latter is the most common species, occurring abundantly in open woods, and attaining a height of from eight to twenty feet. "The wood of the Cornels is hard and close-grained, and is used in Europe for cogs in mill wheels, and for other small articles formed by the turner; and in America as a substitute for Boxwood"–Emerson. Our native species are mostly too small for use except for purposes of ornament.

HONEYSUCKLE FAMILY—*(Caprifoliaceæ).*

The members of this family in the New Brunswick flora embrace, in addition to the lowly but beautiful and fragrant Twinflower (*Linnaea borealis Gro.,*) common everywhere, several species related to the Honeysuckle [e. g. the Fly Honeysuckle (*Lonicera ciliata* Muhl,) the Mountain Fly Honeysuckle (*L caerulea* L) and the Bush Honeysuckle (*Diervilla trifida,*) sometimes employed for hedging,] two species of Elder and three of Viburnum. The Elders are the Common Elder (*Sambucus Canadensis,*) characterized by flat flower-clusters, appearing in May, and by a purplish-black fruit, and the Red-berried Elder (*S. pubens Michx*) having convex or pyramidal flower-clusters, appearing earlier than those in the other species, and bright-red berries. Both are common, especially in rich woods, along the banks of streams and in open places, and whether in flower or fruit, can hardly fail to attract attention.

The species of *Viburnum* are the Witherod (*V. nudum* L.,) a

low shrub, common in cold swamps, the Cranberry Tree or High Bush Cranberry (*V. Opulus* L.) growing usually in flats along river valleys, and the Hobble Bush or Wayfaring Tree, common in dark rocky woods. The first species, as its name implies, is available for making withes, binding sheaves, &c., and is used by the Indians for tying their traps. The Cranberry Tree or High Bush Cranberry is a handsome shrub, and is also valued for its fruit, which is large handsome and with a pleasant flavor, but greatly inferior to that of the true Cranberry. In its cultivated state, with sterile flowers, it is the Snow-ball Tree, highly prized for ornamental purposes. The Hobble Bush is familiar to every frequenter of the forest alike for its handsome and conspicuous flowers, and for the serious impediment afforded by its straggling branches and procumbent stems to any rapid progress through groves in which it is abundant. The fruit (called Moose Berry) when quite ripe, has an agreeable flavor.

HEATH FAMILY—*(Ericaceæ).*

This family is represented in New Brunswick by a considerable number of berry bearing species, all of which, however, are of small size and valuable chiefly for the fruit which they yield. They are, with a single exception, that of the Black Huckleberry, (*Gaylussacia resinosa Torr. and Gray,*) found in swamps and barrens, and belong to the one genus *Vaccinium*, of which the species are as follows:—

Vaccinium Oxycoccus–L. (Small Cranberry.)
" *macrocarpon, Art.* (Common American Cranberry.)
" *Vitis Idæa, L.* (Rock Cranberry.)
" *uliginosum, L.* (Bog Bilberry.)
" *Pennsylvanicum, Lam,* (Dwarf Blueberry.)
" *Canadense Kalm,* (Canada Blueberry.)
" *Corymbosum, L.* (Common Swamp Blueberry.)

The rock Cranberry grows in great abundance on the rocky territory which extends from the Magaguadavic to the Saint John around the shores of the Bay of Fundy. The fruit is small and of a bright red color and is a more certain crop than are the larger bog berries.

Thousands of bushels are yearly gathered in the locality referred to, which find a ready market in the Province. The average value is about $1.50 per bushel.

A resident of the Parish of Pennfield, in the County of Charlotte, some years since obtained $500 per year for the rent of a Rock Cranberry barren. He leased the right to pick these berries to young women in the neighbourhood, who gave him half of the result of their labour as his share of the profits.

An active picker can gather two bushels in a day. They begin to pick them when they are not more than half grown, the under side being white. After being gathered this colour rapidly changes to dark red. No attempt has ever been made at cultivating this fruit.

The middle section of New Brunswick, extending many miles south, from a line drawn about N. E. and S. W., from Fredericton, the Capital of the Province, embraces the Coal measures, which not having been subjected to many great disturbances present generally a level surface. Within this limit are contained many thousands of acres of barren lands and peat bogs, many of which are adjacent to the numerous railroads by which the Province is intersected. In this barren district, largely Crown lands, numerous lakes andponds occur, around the shores of which, the Common American Cranberry is found in abundance. In but one instance, has there been any attempt at cultivating this valuable fruit made, which was by Mr Jacob Corey.

Mr. S. M. Starkey of Johnston, Queens County, New Brunswick, says: "That Mr. Corey, about six years since, undertook "to drain a shallow lake about three quarters of a mile wide, "situated on Fork Stream, one of the tributaries of the New "Canaan River; around which lake a limited quantity of cran- "berries had grown. He commenced by deepening the stream "leading from the lake, at the same time building a dam for the "purpose of flowing, in order to kill the small shrubs which sur- "rounded the flat shores of the lake. This dam he shut down in "the Autumn and raised in the month of June following. To his "astonishment he found cranberries springing up in great "abundance. Without any previous instruction Mr. Corey com-

"menced the cultivation of the berry, and about three years "since gathered, in one autumn, eight hundred bushels."

Mr. Starkey, who is a Deputy Crown Land Surveyor, further says that "there are numberless places on the Crown Lands of "New Brunswick much better adapted to the cultivation of the "cranberry than the location chosen by Mr. Corey."

At a meeting of the New Jersey Cranberry Association, held at Trenton in the month of January, in the present year, (1876) it was stated that the United States had 15,000 acres in cranberry culture, at a cost valuation of $4,375,000, and that the estimated crop for the year 1875, was 210,000 bushels, being 65,000 less than in 1873. At this meeting an extract was read from a late Parisian paper, which was as follows:

"The American cranberry, which, in its peculiar qualities of size, flavor and color, is quite unlike any other fruit in the world, grows in luxuriant abundance in its own peculiar soil. It has always been valued by the *bon vivant*, and is now not only a table necessity in the United States, but the physicians have discovered that it is invaluable as a remedy for gastric diseases. It is added to the rations of the soldiers and sailors, as it is the only anti-scorbutic known to materia medica. Last year 270,000 bushels were sold in the city markets of America. This season they are to be found in almost all of the first class fruit and grocers shops in Paris."

This fruit has been found invaluable as a specific for swollen erisypelas when applied in the form of a poultice.

The blueberry is exceedingly abundant, especially on sandy plains and rocky barrens, such as occur along the coast and over much of the area occupied by rocks of the coal measures. They are frequently gathered in the autumn by the farmers and dried for winter use, taking the place of the Zante currant in home-made cake.

The other interesting plants of this order *(Ericaceæ)* ocuring in New Brunswick, are the Mayflower, (*Epigaea repens*) the much prized and beautiful harbinger of spring, the Winter Green (*Gaultheria procumbens L.*) valuable as the source from which a favorite flavoring extract is derived, the Lamb-kill and Laurel, (*Kalmia angustifolia, L.* and *K glauca Ait.*) well known for their showy blossoms so common in barrens and swamps, the Rhodora, associated with the last, and equally conspicuous, and the Labrador Tea (*Ledum latifolium Ait.*)

THE HOLLY FAMILY.—*(Aquifoliaceæ).*

The two representatives of this family in New Brunswick are the Black Alder (*Ilex verticillata Gray*) and the Wild or Mountain Holly (*Nemopanthes Canadensis.*) Both are shrubs, from six to ten feet in height, and both are common in low swampy woods throughout the Province, being conspicuous in autumn for their crimson or bright scarlet berries. Both the bark and berries of the Black Alder are available in medicine for the treatment of intermittent fevers and diseases of the skin.

OLIVE FAMILY—*(Oleaceæ).*

The only representative of this family in New Brunswick is the genus *Fraxinus* or Ash, of which there are four species.

White Ash, (*Fraxinus Americana–L.*)

This, from its large size, the most important of the Ashes, is sparsely found in all parts of the Province, and upon almost every variety of soil, though attaining its perfection only in rich loamy woods and in the vicinity of streams, where it can obtain abundant moisture. Under favorable circumstances it rises to a height of 50 or 60 feet, with a straight undivided trunk for 30 feet, and a diameter of nearly two feet. It is usually scattered among other trees, rarely, if ever, forming groves.

The qualities from which Ash wood derives its value are its strength, toughness and elasticity. In consequence of these properties it is extensively employed by carriage and sleigh makers, especially for shafts and springs, in the manufacture of chair and sofa frames, for agricultural implements such as pitchforks and rakes, and for a great variety of smaller articles. For the manufacture of oars it is preferred to all other woods.

The Red Ash, (*Fraxinus pubescens Lam.*)

This tree has been observed by Mr. G. F. Matthew, growing upon Darling's Island, in the Kennebeccasis river, and probably occurs elsewhere in the Province, but as it nearly resembles the White Ash, and grows in similar situations, it is probable that the two have sometimes been confounded. Besides being a smaller tree than the White Ash, the Red is easily dis-

tinguished by the downy character of its leaves and newer branches, from which its specific name is derived. Its wood, though used for similar purposes, is less valuable than that of the White Ash.

BLACK OR WATER ASH, (*Fraxinus sambucifolia Lam.*)

This tree is mostly confined to swamps and the muddy banks of rivers.

It is very common along the shores of the St. John and Kennebeccasis rivers, but is found in its greatest abundance on the branches of the St. John, above the Grand Falls, especially on those of the Grand and Green rivers, the shores of the former being fringed by it for many miles. From this locality it can be conveyed by water very cheaply to the Grand Falls, and when the New Brunswick railway reaches that point, from which it is now distant only about twenty miles, no better place in the Province can be found for the manufacture of boards from this wood. It attains a height of forty feet or more, and a diameter of two feet. It comes into leaf very late in the season, and loses its foliage early.

The wood of the Black Ash, though inferior to the White in strength and durability, is nevertheless remarkably tough, and owing to the facility with which, after pounding, it may be separated into strips and ribbands, is especially preferred to other woods by the Indians, for the manufacture of baskets, of which very handsomely ornamented ones are made by the Tobique Indians.

It has also been employed for hoops and chair bottoms, and for bed room furniture, for panelling railway cars, for seats in churches, and is largely taking the place of other woods in New Brunswick in the construction of sleighs and pungs. It is when split durable for fencing.

NETTLE FAMILY—(*Urticaceæ*).

SUBORDER I. THE ELM FAMILY--(*Ulmaceæ.*)

THE ELM, (*Ulmus Americana-L.*)

Though comparatively restricted in its distribution, there are nevertheless few trees in New Brunswick, which, when the proper

conditions are accorded, exceed the Elm in the length or vigor of its growth, certainly none which can compare with it for grace and beauty. On the uplands it is comparatively rare, and even when occurring seldom attains to any great size, but in river valleys, and especially along the rich and level intervales bordering the St. John river and its tributaries, it is much more abundant and often of large size, its beautiful feathered and plume like trunks serving greatly to enhance the beauty of the scenery. Trees are occasionally met with girthing twenty feet.

The wood of the Elm is both strong and elastic, and therefore well adapted for the making of ship's blocks, hubs of carriage-wheels and kindred uses, though said to be inferior for these purposes to the English Elm. It is also used in making the flats of ship's floors, though difficult to work, the peculiarity of the grain requiring it to be planed cross-wise rather than length-wise. Its value in New Brunswick, however, is almost solely as an ornamental tree, it quite equalling if not excelling in this respect, its European relative. It is readily transplanted, hardy when in favorable situations, and of rapid growth.

WALNUT FAMILY—*(Juglandaceæ–L.)*

The Butternut, (*Juglans cinerea–L.*)

The Butternut is by no means an abundant tree in New Brunswick, being mostly confined to the southern counties and the valley of the St. John river, especially above Woodstock, while it is absent from the coast and also, according to Mr. Fowler, from the northern counties of the Province. It is usually met with in rich moist lands, especially in calcareous districts, and some of these, such as Butternut Ridge, in King's Co., have received their names from its former abundance in their vicinity. It is rarely met with away from roads or settlements. Although never a tall tree, it thrives well under cultivation, and sometimes attains a height of sixty feet or more.

The wood of the butternut is one adapted for numerous and various uses. Its rich reddish-yellow color, darkening with age and then nearly resembling the English Oak, as well as its

lightness, render it very suitable for cabinet work, for which it is also well adapted by the readiness with which it will receive paint or varnish, and the fact that it is not readily split by nails. For a like reason it may be advantageously employed for carriage making and similar uses, being at the same time both light and durable. It is especially well fitted for purposes of interior decoration, and has thus been employed with excellent effect, both in the Cathedral in Fredericton, and in other churches through the Province.

Of minor uses, the employment of the bark and nut-shells in dyeing may be mentioned, as well as that of the young half-grown nuts for the making of pickles. The bark is also said to yield an extract possessed of mildly purgative properties.

OAK FAMILY—*(Cupulifer–L.)*

The representatives of this family in the New Brunswick sylva are; (1.) The Red Oak (*Quercus rubra L.*,) the American Beech (*Fagus ferruginea Ait.*,) the Beaked Hazel-nut (*Corylus rostrata Ait.*,) the American Hornbeam (*Carpinus Americana Mich.*,) and the American Hop Hornbeam (*Ostrya Virginica Willd.*,) to which may be added, as introduced at a few points, the Chestnut (*Castanea vesca L.*)

1. The Red Oak (*Quercus rubra L.*)

This, the only species of Oak occurring in New Brunswick, is both common and widely distributed, being met with in all parts of the Province, especially along the banks of streams, and, as in Charlotte Co, along ridges of slaty rocks. It is, however, a tree of inferior value, it being difficult to season, imperfectly combustible, and, unlike other species of the same genus, worthless for the purposes of the tanner. It is, however, of rapid growth, flourishes readily in almost all situations, and owing to the beauty of its trunk and foliage is well adapted for ornamental purposes.

To the above varieties may be added the occasional occurrence of the White and Grey Oak in special localities. They are, however, so rare as to require no special mention.

2. American Beech (*Fagus ferruginea, Ait.*)

Three different kinds of Beech, viz: the Common Beech, the White Beech and the Red Beech, are distinguished by lumberers and others. They are, however, probably all varieties of a single species—the White or American Beech, the differences depending, according to Emerson, simply upon the greater or less rapidity of maturation, and the consequent different proportion of the (white) sap wood or (red) heart wood. In one or the other of its forms it is an abundant tree throughout the Province, except upon the Southern coast, abounding especially upon ridges of feldspathic rocks, and in rich moderately moist soils. It is a tree of rapid growth, increasing its diameter under favorable circumstances as much as two-thirds of an inch in a single year,* and attaining, sometimes, a height of not less than seventy feet.

The Beech is extensively employed for purposes of fuel, being indeed, for that purpose, second only to the Rock Maple. The wood is "hard, of a fine smooth close grain, and very dense, having a specific gravity of .724" (Emerson.) It is durable when kept dry, and also when permanently wet, as in the bottom of vessels, but decays rapidly when subjected to alternations of these conditions. It has been found well adapted for the manufacture of saw-handles, shoe-lasts, plane-stocks, &c., as well as for chair-posts and farm utensils. From its ashes large quantities of alkali are obtained for the manufacture of soap. Its nuts are oily and nutritious, and afford a large portion of the nourishment of various wild animals, including the bear, partridge and squirrel. Young Beeches properly arranged, and by grafting made to grow together, are said to make very solid and elegant hedges, but have the disadvantage of checking the growth of other plants near or under them. The Beech is said never to be struck by lightning.

3. The Beaked Hazel (*Corylus rostrata, Ait.*)

This is but a small shrub, two to five feet high, rather common in all parts of the Province, in fields and along the banks of streams, but of little or no economical interest. Its fruit is in-

*Emerson.

ferior, both in size and quality, to that of the true hazel or filbert.

4. The Chestnut (*Castanea vesca, L.*)

This tree, so highly prized in somewhat more Southern latitudes alike as an ornament and for its abundant and agreeable fruit, can hardly be said fairly to have a place among the trees of New Brunswick. None are met with in a wild state, and though a few have been introduced from time to time, they do not appear to thrive, and are rarely seen.

5. The Hornbeam (*Carpinus Americana, Michx.*)

This tree, though by no means an abundant one, is occasionally met with in the New Brunswick woods, especially in the central and southern counties, along the banks of streams. It is never a large tree, and derives its interest chiefly from the hardness of its whitish wood, which has led it to receive the name of Iron-wood, a designation which it shares with the closely related species the Hop Hornbeam. It is a tree of considerable beauty and well worthy of cultivation.

6. The American Hop Hornbeam (*Ostrya Virginica, Willd.*)

This tree, readily distinguished from the preceding by the hop-like fruit from which its name is derived, is, like the latter, comparatively rare in New Brunswick, though apparently distributed over its entire area. It is generally met with in rich woods, attaining a height of from twenty to thirty feet. Like the preceding species, with which it shares the name of Iron-wood, it is remarkable for its toughness and compactness, adapting it for the manufacture of levers and similar uses, whence it is also often called Lever Wood. It is also employed for the cogs of mill-wheels and for agricultural implements.

THE BIRCH FAMILY (*Betulaceæ.*)

The members of this family embrace, in New Brunswick, five species of true Birch, and two of Alder.

1. American White Birch (*Betula alba–var. populifolia–Spach.*)

The White Birch, or Little Gray Birch as it is also sometimes called, is a very common tree in New Brunswick, especially near the coast and upon the poorer class of soils, such as occur

over extensive tracts occupied by the rocks of the coal-measures. It is usually met with in large groves associated with spruce, pine or other soft-wood trees, and under favorable circumstances, attains a height of from thirty to forty feet. Its chief value is for fuel, though inferior even in this respect to most of the other deciduous trees.

2. The Paper Birch (*Betula papyracea–Ait.*)

The Paper Birch, like the White Birch which it nearly resembles, is found in all parts of New Brunswick, but usually in soils somewhat more fertile than those covered by its relative. It is said especially to favor gravelly soils and the slopes and bottoms of valleys covered with large and moss grown rocks.

It is also a larger tree than the White Birch, having sometimes a height of seventy or eighty feet, the lower sixty without branches, and a diameter of two feet. It is easily distinguished by its tough and separable bark, this being the material still largely employed by the native races in the manufacture of their canoes. The wood of the canoe or Paper Birch is fine and glossy, soft, and of a handsome color, but possessed of little durability or strength, decaying rapidly under alternations of dryness and moisture. It is therefore rarely used except for indoor work and for such articles as are to be kept permanently dry. It answers moderately well for fuel and is said to yield an excellent charcoal.

3. The Yellow Birch, (*Betula excelsa–Ait.*)

This is one of the larger, and therefore, more valuable of the Birches, its straight and nearly uniform trunk attaining at times a height of seventy, and a diameter of two or more feet. It is a very common tree in New Brunswick, growing usually on rich, soft and moist lands, in company with spruce and ash, and besides being extensively employed for many domestic uses, and for ship-building, forms with the Black Birch an important article of export. Its wood, which is close grained and durable, though lacking in strength, is said to be somewhat inferior to the latter, but not sufficiently so to cause any difference in their relative price, the two being sold indiscriminately. Besides its employment in ship-building, it has been advantageously em-

ployed in cabinet work, chair-making and similar uses, being readily bent, as well as susceptible of a high polish, and deriving additional beauty from the peculiarly irregular and variegated disposition of the grain. The young saplings make excellent hoops of casks, while the bark finds an important application in dyeing. It is readily combustible and is valued as fuel.

4. Cherry Birch, Sweet or Black Birch, (*Betula lenta–L.*)

This, the handsomest as it is the most valuable of the Birches, is found in all parts of New Brunswick, flourishing in nearly the same situations as its relative, the Yellow Birch, and attaining about the same proportions. It is especially common on the deep and shady banks of rivers, and on gravelly ridges along the shores of the Bay of Fundy.

The principal use of the Black Birch is for the manufacture of square timber for export and in ship-building, especially for the keel, lower timbers and planks of vessels, its most important characteristic being its durability when kept permanently wet. Being of a fine and close grain, readily capable of being polished, as well as possessing a rich color, somewhat resembling mahogany, it is also largely used for chair and cabinet work. It is employed by the carriage makers for panels, and by the shoe-makers for lasts. Finally it is an excellent fuel, ranking in this respect, second only to the rock-maple. Its bark is used by the tanners.

5. Low Birch, (*Betula pumila–L.*)

This plant, a low shrub from two to eight feet high, has been observed by Rev. James Fowler, growing in a bog near Kingston, Kent County, and probably occurs elsewhere in the Province, but is without economic interest.

Swamp Alder, (*Alnus incana Willd.*)

When dry makes good firewood, and gives an excellent charcoal.

THE WILLOW FAMILY (*Salicaceæ.*)

This family is represented in New Brunswick by at least ten different species of Willows, two Aspens and as many Poplars.

The species of true Willow at present known to occur are as follows:

Low Bush Willow, (*Salix humilis, Marshall,*) on road-sides near Bass River, Kent.

Glaucous Willow, (*S. discolor, Muhl,*) banks of streams, Kent and Westmoreland.

Petioled Willow, (*S. petiolaris, Smith,*) swamps near Richibucto, (Rev. J. Fowler.)

Basket Osier, (*S. viminalis*–L.) introduced in various places.

Long-beaked Willow, (*S. rostrata Rich,*) borders of swamps, common.

White Willow, (*S. alba,*) common about Fredericton, introduced.

Black do. (*S. nigra, Marshall,*) Napan, Miramichi.

Shining do. (*S. lucida, Muhl,*) rather common.

Stalk-fruited Willow, (*S. pedicellaris Pursh,*) swamps, Kent County.

Besides these there are a number of species as yet undetermined. Of those above enumerated, the first three and the last are shrubs, the others mostly low trees, only one, the White Willow, an introduced species, exceeding twenty-five feet. All possess considerable beauty, as well from their foliage as their showy fruit, and growing as they mostly do along the banks of streams, are with the alders an invaluable means of protecting the latter against the destructive effects of freshets.

The wood of the Willows has, in other countries, many and important applications, especially in basket-making, for which their lightness, toughness and pliancy render them well adapted, but little use has as yet been made of those occurring here.

The Aspens and Poplars are all species of a single genus, (Populus.) Of these the most common in the wild state is the American Aspen, (*P. tremuloides, Michx,*) a small but graceful tree, from twenty to forty feet high. A second species, the large-toothed Aspen (*P. grandidentata, Michx,*) is somewhat larger but less common. The wood of both is light and answers well for fuel, but has little durability, and therefore few economic applications. The Balsam Poplar (*P. balsamifera*) is rare in the wild state, but with its variety the Balm of Gilead (*var. candi-*

cans) is not frequently cultivated for ornamental purposes. The Lombardy Poplar (*P. dilatata*, Ait.) has also been introduced for a similar purpose, and sometimes appears to thrive well, though often the early blighting of the branches gives to the tree a ragged, unsightly appearance.

DIVISION II.

PLANTS WITH NAKED SEEDS—(*Gymnospermæ.*)

FAMILY I. PINE FAMILY (*Coniferæ.*)

SECTION I.

The Pine and Fir Tribe—(*Abietinæ*).

The representatives of this tribe in New Brunswick are, (1) The White Pine; (2) The Red or Norway Pine; (3) The Gray or Northern Pine; (4) The Hemlock Spruce; (5) The White or Single Spruce; (6) The Black or Double Spruce; (7) The Balsam Fir; and (8) The American or Black Birch, Tamarack, Hackmatac or Juniper.

1. The White Pine—(*Pinus strobus–L.*)

The White Pine is one of the largest, tallest and most stately trees in the New Brunswick forest, many of the older trees rising in a single straight but tapering column to a height of 80 feet or more, in rare instances to over 120 feet.

The several varieties distinguished locally as "Pumpkin Pine," "Sapling Pine," and "Bull Sapling," owe their origin to a slight difference in the color, texture and specific gravity of the wood, dependant upon corresponding differences in the condition of their growth. The first named is found standing most thickly near the shores of streams, or on hill sides fronting on lakes or streams, but seldom extending back from such streams or lakes, in any quantity, further than half or three quarters of a mile.

When found in the forest distant from streams or lakes, the Pumpkin Pine as well as the Bull Sapling occur in small groups or bunches or in pairs or solitary, a very considerable distance often intervening between groups or individuals.

Sometimes a single tree may be seen towering to the most extreme height of its species on some rocky and elevated hill, in places so difficult of access that the lumbermen, after felling them, either sluice them from their place of growth to where they can be more conveniently managed, or remove them with the aid of ropes and blocks, either with or without the assistance of horses and sleds. The soundest and best Pumpkin and Bull Sapling Pine are found growing scattering on high land, very frequently surrounded by forests of hardwood. Such as grow in low and swampy land are very subject to shakes and concave knots. These varieties of pine of large size have become very scarce in the Province of New Brunswick, so much so that the lumbermen often cut roads half a mile or more in length to reach a choice tree. Nearly all the Sapling Pines of New Brunswick are found growing on the dry and sandy soil of the coal measures, covering the low ridges, and surrounding the heaths and bogs which abound on the surface of this formation.

The great fire of Miramichi, in the year 1825, and the Saxby gale which happened a few years ago, have done many millions of dollars damage to the pine lands of New Brunswick, and the day is not very far distant when pine trees of any size will be obtained with difficulty in the Province.

2. The Red or Norway Pine, (*Pinus resinosa, Ait.*)

"The Red or Norway Pine has an erect trunk, taller and more slender than that of the Pitch Pine, which it most nearly resembles. The bark, which is much less rough, is in rather broad scales of a reddish color. The long leaves are in twos, and the cones are free from the bristling, rigid, sharp points, which distinguish those of the Pitch Pine. It may also be distinguished at a distance by the greater size and length of the terminal brushes of leaves."—*Emerson.*

Lumbermen are acquainted with two varieties of this tree, which they denominate by the names of the Sapling and Old Red Pine. The former is an inferior wood, generally having those niches of sap which rot very quickly on exposure to the weather. It has been largely used in the state of Maine for hogshead heading, for which purpose it answers very well. The

Old Red Pine, which is now nearly extinct in New Brunswick, sometimes attains the height of 90 feet, and a diameter of three feet or more, the trunk being nearly uniform and without branches for a height of forty or fifty feet or more. The wood is strong and durable, resembling that of Pitch Pine, but with less resin, and was formerly largely employed like the latter for the decking of vessels and for beams. It has a fine compact grain with few knots. It grows as a scattering tree on dry and sandy soil, some of the best trees which were ever obtained in New Brunswick, having been cut on the granite boulder district, which crosses the New Brunswick and Canada railway, about fifty miles from St. Andrews. The Tobique river, however, was the great nursery of the Old Red Pine, especially that branch of it which is called the Wapskyhegan, it being here so abundant and the trees standing so close together that there was hardly room left to turn a sled between the stumps. The axe and fire have, however, completely removed them from this locality.

3. Gray or Northern Scrub Pine, (*Pinus Banksiana–L.*)

This tree is readily distinguished from the other species of Pine by its comparativly scrubby growth, as well as by the color and appearance of the peculiar scales by which the trunk is surrounded, as well as by the pendant cones which hang under the branches, as its name denotes it is a tree of inferior growth, timber made from it in former times when it was tolerably abundant, was considered good if it averaged ¾ of a ton to the tree. The wood is very hard, full of pitch and free from sap, but is apt to be full of streaks. It has been a good deal used for railway ties, small trees fit for such purpose being yet abundant in the Province.

Certain sections of country on the South West Miramichi which were destroyed by the great fire of 1825, have since become covered so thickly by forests of Banks' Pine that it is almost impossible to press one's way through them. This tree grows very extensively on the desolate mountains of the Little South West Miramichi.

4. The Hemlock Spruce or Hemlock, (*Abies Canadensis, Michaux.*)

The Hemlock Spruce or Hemlock as it is often more simply

termed, is one of the most abundant of our evergreen trees, being found on almost every variety of soil. It is also when in perfection a very beautiful tree, but as age advances owing to the death or breaking off of the lower limbs is apt to assume the appearance of premature decay. Under favorable circumstances it reaches a height of 70 or 80 feet and a circumference of from 6 to 9 feet, the latter as in others of the family being nearly uniform until the branches are reached. There are two varieties of this tree known to woodsmen, the Sapling or White Hemlock, and the rough bark or Black Hemlock. The latter, owing probably to its large and heavy top, is very subject to shakes, rendering the boards sawn from the lower log nearly worthless. The wood of the Sapling or White Hemlock, with the exception of a small piece near the butt, is a sound and firm wood, lasting well. Both varieties however, are wanting in strength, and owing to the comparative absence of resin unable to bear the alternations of drought and moisture. When not exposed to the atmosphere it is very durable, being largely employed as a substitute for other woods in the exterior construction of dwellings and out-buildings, as well as for framing purposes.

It is of much more frequent occurrence in the southern or middle districts of New Brunswick than in the north, being a rare wood north of the Grand Falls of the St. John. It occurs in belts and bodies, in certain localities the laws regulating its place of growth not being understood. It is very subject to the action of fire, and disappears rapidly from the neighbourhood of settlements. It was formerly very abundant on the lower portion of the Nashwaak, while it is but rarely found above the Narrows, forty miles from the mouth. It is abundant on the Intercolonial railroad north of Moncton, where there are extensive tracts of vacant Crown lands, and a large business in the transportation of its bark, was last season, commenced on that road. This article, in that locality will increase much in value, owing to the facilities of transport to a port of shipment. The tree is peeled early in the summer, and the bark hauled immediately to the road, and can be exported during the same season.

A large belt of Hemlock also crosses the St. John river and

New Brunswick railway, 30 or 40 miles above Fredericton. In the granite formation, the wood here is especially good, owing perhaps to the disintegration of potash from the decomposition of the feldspar contained in the granite by the action of time, frost and moisture.

The wood of the Hemlock shrinks but little, and is impervious to the attacks of rats, so that it is now being much used in the construction of granaries. The white variety forms excellent planking for side walks, both varieties are largely used in the Provinces for wharf building.

5 The White or Single Spruce, (*Abies alba, Michaux.*)

This tree is larger and more slender than the black Spruce, being distinguished from the latter, as its name implies, by the lighter color of its bark and leaves.

On the Restigouche, Upper St. John and many other places, it grows to a great height with but little taper. Mr. J. A. McCallum, Deputy Surveyor, in 1873, had a tree cut down on the former stream above the Quatamkedguick which made a log measureing 14 inches at the butt, 10 inches at the top, and was 64 feet long. They have been cut 80 feet long, measuring 25 inches in diameter at the butt, and 18 inches at the top.

White Spruce are found in valleys, growing to a very large size, skirting streams, and in small bunches on the sides and tops of hills. The yield of White Spruce land will not compare with that of the Black, as the former tree is much more scattering in its growth than the latter.

The wood of the White Spruce is white and soft, and generally free from knots. Its specific gravity is less than that of the Black Spruce to which it is much inferior in strength, and exhibits much less elasticity. The Spruce deal shipped from the Nepisiguit and Restigouche rivers are nearly all manufactured from the wood of this tree.

The Black Spruce, (*Abies nigra, Michaux.*)

As an article of export, this is the most valuable of all the trees of New Brunswick. The vast forests of Black Spruce which once covered the Province have been reduced by fire and cutting to less than one third of their original extent.

This tree was found in greatest abundance in the southern part of New Brunswick. A line drawn from the first Eel River lake, extending north-easterly to the dividing ridge between the little South West Miramichi and the Nepisiguit, is about the boundary of the great Black Spruce lands of the Province. South of this line vast forests of it extended from the Schoodic, crossing the Nashwaak and south west Miramichi, thence to the north west branch of the last named river, where it ended. North of this line the growth of wood is more generally hardwood, largely mingled with firs. Such Spruce as occur along the shores of streams or scattering on the hills sides are principally of the white variety.

Black Spruce is commonly found growing in thickest bodies around lakes or about the base and sides of ridges whose summits are covered by hardwoods, the Spruce thinning out as the elevation increases. Like the White Pine it attains its greatest size and altitude when growing among surrounding hard-woods. The distinguishing properties of the wood are strength, lightness and elasticity. That found on the shores of the Bay of Fundy is remarkable for its toughness and durability, and is thought by many to be nearly equal for the purposes of ship-building to Hackmatac. It furnishes as fine yards and top masts as any in the World, and for this purpose it has been long and extensively used.

Heretofore the smaller trees have been largely exported from the head of the Bay of Fundy in the round log, to be used as piles for wharf building. The principal root and the lower part of the trunk are extensively used for the purposes of ship-building, constituting knees and foot hooks.

By means of the small fibrous roots, the Indians of Maine and New Brunswick sew together the pieces of birch-bark which form the exterior covering of their canoes.

Very superior clap-boards are made from the clear butts of these trees. The wood of those having straight seams from the butt almost to the branches is generally the best for this purpose when such seam or rift is straight. In many localities Black Spruces are very seamy. This occurs sometimes on the low lands but oftener on the ridges, and is probably caused by the

joint effect of wind and frost. A cheap variety of shingles is obtained from small trees. Their great value, however, to New Brunswick, arises from their furnishing the major part of the deals and battens, which are annually exported thence to Great Britain and other countries.

The manufacture of Spruce deals commenced in New Brunswick in 1819, and has since been steadily increasing. The amount exported from the port of St. John in 1874, was 220. 807.110, and in 1875, 175.908.030 superficial feet.

8. The American or Black Larch or Hackmatac, (*Larix Americana, Michx.*)

The American or Black Larch, called by the French Canadians Epinette Rouge, by the descendants of the Dutch the Tamarack, but among the English more commonly by its Indian name of Hackmatac, is one of the most valuable trees of the New Brunswick forest. Its favorite place of growth and where it usually attains its greatest size is on or near the banks of some sluggish brook, growing especially well among that variety of wild grass known as "blue joint." It generally surrounds the barren boggy heaths which abound in the middle section of New Brunswick, those trees growing on the bogs being very stunted and small, while those just on the edges of the heath attain a large size, and frequently afford good roots for ship-building purposes. The roots of those found on intervale land are, however, generally sounder and larger, though the trees are not so abundant. Many of the finest and largest Tamaracks have been found growing out of old beaver dams, and these industrious animals may claim the honor of having prepared the soil for the growth of some of our finest Tamaracks.

Where this tree does not have a moist soil, its growth is very scanty and small. It is capable of ready propagation. By the artificial planting of the tree, a period of seventy years would yield timber fit for all the ordinary purposes of ship-building, In certain parts of Great Britain the Larch is planted for hop poles. In eight or nine years these are cut, bundled up and sold for that purpose, while the roots are pulled up and dried for kindling.

The wood of the Larch, which is very resinous and compact, is remarkably durable. It has been said to be more lasting in ships timbers than that of Oak. There are two varieties known among woods-men, the White and the Yellow, the former being much inferior to the latter in strength and durability.

Tamarack is largely used in ship-building for timbers, knees, beams, &c., of ships. It has been so well sought after in New Brunswick that large roots and timber have become very scarce, and cannot be obtained unless at very considerable expense.

In the County of Aroostook, in the State of Maine, trees of Hackmatac have been obtained from which have been made four tons of timber. As the New Brunswick railway has been completed to Fort Fairfield, above the Aroostook Falls, an excellent means of transit is opened up for the large roots and timbers of that County.

As regards the growth of Tamarack, the lumbermen make the remark, that in almost every place where you find a very large Tamarack, apparently growing alone, by searching a few rods on either side you will find a companion of nearly similar proportions. Hackmatac planks are well adapted for floor boards and door steps, from their extreme hardness, and an infusion of the boughs and bark furnishes a good alterative for horses.

The Balsam Fir, (*Abies balsamea, Marshall.*)

This tree, also known as the Fir Balsam, the Silver Fir, or yet more simply as the Fir, is a common tree in New Brunswick, being found in nearly all localities, but in greatest abundance and most compact bodies on the head waters of the St. John and Restigouche rivers.

It is a tree of rapid growth and very hardy, but is short lived and rarely attains a large size. Its beautifully symmetrical pyramidal shape, rich dark-green foliage, and conspicuous cones must always make it a valuable tree for ornamental purposes, at least when young, but otherwise it posseses little interest, the wood being not only small but wanting in hardness, strength and elasticity. As indicated by its name, it is rich in resin, or rather in turpentine, which is contained in small vesicles or tum-

ors covering the trunk and limbs. This is usually known by the name of Canada balsam, and is employed in medicine for pulmonary complaints, and in the arts for the manufacture of varnish.

SECTION II.

The Cypress Tribe—(*Cupressinæ.*)

The only representatives of this section in New Brunswick, (marked by having a globular or irregular head, instead of a true cone for fruit,) are the White Cedar or Arbor Vitæ, the Red Cedar and the Juniper.

The American Arbor Vitæ, (*Thuja occidentalis-L.*)

This tree, often but improperly called the White Cedar, is abundant in New Brunswick.

It is met with everywhere in low grounds and swales, but especially where the soil is clayey and the drainage imperfect. The largest and best trees occur intermingled with hardwood. They grow thickest in what are called cedar swamps, forming for short distances dense forests well nigh impenetrable. When growing thickly together the wood is generally very defective and the diameter comparatively small, rarely exceeding one to two feet.

On the dry limestone hills near St. John, this species forms dense thickets of beautifully pyramidal trees. It is found in greatest abundance, as well as of the best quality, on the Restigouche river and on the upper St. John. Mr. J. A. McCallum, when surveying the dividing line between the counties of Victoria and Madawaska, commencing about ten miles north east from the Grand Falls, observed thousands of cedars which were three feet and upwards in diameter, which growth extended for many miles. When on the head of the Restigouche, he also noticed great quantities of excellent cedar.

On the north of Tobique and on Salmon river, are vast tracts of hardwood, intermingled with the finest of cedar. The Crown lands on the Nictaux branch of Tobique, for many miles, are well lined with clean and straight trees of this species, well adapted to the manufacture of cedar shingles or sleepers. As this

stream is remarkably smooth, these trees can be conveyed thence by water, very cheaply, to railway communication. The Honorable Senator Ferguson, of Bathurst, says that the White Cedar is much used in the eastern part of the county of Gloucester, for building boats, that boards can be got from six to nine inches wide for planking, and that the roots make excellent timbers, as they are both light and durable. Boats made from cedar also answer well.

The wood of the White Cedar is very soft, light and fine grained, of a reddish tint, and like its twigs, possessed of an agreeable aromatic odor. It is readily wrought, and is also very durable, being especially adapted for fencing, and for such other purposes as necessitate frequent alternations of dryness and moisture. It is very largely used in the manufacture of railway ties; four years since one firm in Fredericton exported sixty thousand sleepers, while the exports of the same article from St. Andrews during the same year were more than double that number. The principal use of this wood has been for fencing, and for the manufacture of shingles, of which vast quantities of excellent quality are exported from Fredericton annually, many of which, however, are cut on the American side of the St. John.

2. The Red Cedar. (*Juniperus Virginiana–L.*)

This plant, as occurring in New Brunswick, is represented only in the form of a low prostrate shrub, forming the variety "*humilis*" of Hooker, and appears to be confined for the most part to the vicinity of the coast. It has been thus observed by Mr. G. F. Matthew, growing on limestone hills in St. John county, and by the Rev. J. Fowler, on the sandy beaches of Eel River in Restigouche county. The larger variety occurring in New England, and attaining under favorable circumstances a height of thirty or forty feet, is a tree of some importance, its wood being light, close grained, compact and very durable, and therefore highly valued by the ship builder as well as the carpenter, cabinet maker and turner, but if occurring in New Brunswick, is not sufficiently abundant to be employed for economic purposes.

3. American Yew or Ground Hemlock (*Taxus baccata, L., var. Canadensis.*)

The American Yew is everywhere a low and straggling or prostrate bush, destitute of any ascending trunk, and remarkable chiefly for the rich and deep color of its evergreen foliage. It is common in New Brunswick, chiefly in shady woods, but, though possessing a heavy, tough and elastic fibre, has been but little used.

Conclusion.

In concluding the description of the Woods and Shrubs of New Brunswick, it has occurred to the writers that it might and probably would be a matter of interest to those residing at a distance, to know the situation, quantities and cost of production of the more ordinary woods growing in the Province and which now have commercial value.

In as far as the Black and White Spruce are concerned they are found growing generally at a considerable distance from railway communication, and are driven down small brooks into the larger rivers and thus conveyed to the mills for manufacture.

Birch, Beech, Maple and other hardwoods occur abundantly near the various lines of railroad by which the Province is intersected. The cost of production of Spruce logs at the City of Saint John, is from $7 to $8 per thousand feet, while for logs hauled into the rivers emptying into the Gulf of St. Lawrence, it is but from $5 to $6.

The cost of Pine is entirely dependent on the quality.

Hard woods can be delivered in great quantities at various railroad stations at from $4 to $5 per thousand feet B. M.

A very important industry in hard woods has been carried on for a length of time in New Brunswick, and is one which may eventually develope into much larger dimensions; it is that of the manufacture of ship timber in the forest.

In relation to this subject, T. Cotterel, Esq., M. P. P., who has been engaged during the past twenty-five years in the business of furnishing ship timber for export and home consumption, says that the most economical method of obtaining the frame of a ship is to mould the timber in the woods where the tree

falls, the months of October, November and December being the best time for work, more especially as many roots are required which should be removed before the heavy frosts and deep snows set in. Timber after moulding should be moved to yards or brows as soon as possible. The expense of cutting down, hewing and moulding, varies according to the size of timber. For the frame of a ship of 1,000 tons or upwards, it will be about $6 per thousand feet board measurement; for a frame of 300 tons or under, $8 per thousand feet.

Parties ship-building abroad, could very easily obtain all the hard wood timber which they might require, properly hewn and moulded, by forwarding to the Province, to competent persons, moulds exhibiting the required size of such timber. Thus the transport of all unnecessary wood would be avoided.

THE USEFUL MINERALS

OF

NEW BRUNSWICK.

CHAPTER I.

METALS AND THEIR ORES.

IRON.

Bog Iron Ore or Limonite.

1. Parish of Burton, Sunbury County.
2. " " Maryland, York County.

Deposits of Bog Iron Ore, of greater or less extent, are of not unfrequent occurrence in New Brunswick, the largest as well as the purest beds being found in alluvion overlying the rocks of the coal measures in Queens, Sunbury and York counties. They are in some instances known to cover considerable areas, and, as in the locality from which one of the above specimens was taken, to attain a thickness of four or five feet, but no attempt has hitherto been made to remove or smelt them. An analysis of the ore from Sunbury county yielded forty-seven per cent. of metal.

Red Hematite.

1. Specimens of Red Hematite (with Limonite.)

Jacksontown, near Woodstock, Carleton Co., - *Geological Survey.*

The Iron Ores of Woodstock were first discovered by the geological survey of the State of Maine, under Dr. Chas. T. Jackson, as early as the year 1836, having been traced by him from the Aroostook region in the State above named northeastward to the St. John River, and more recently to the eastward of the latter in several bands for a distance of fifteen or twenty miles,

or over a large part of the northern and northeastern portions of the County of Carleton. The principal locality from which the ore has been removed is in Jacksontown, about three and a half miles from Woodstock, and about two miles from the west bank of the St. John River. As seen at this point, the ore beds, portions of which are a true hematite while others are a hydrous peroxide or limonite, are somewhat irregularly interstratified with a series of clay slates, usually bright red or brownish red in the immediate proximity to the ore, but elsewhere of a pale grey color, and highly inclined. Their width is from six inches to eight feet, the average thickness being about three and a half feet and their number variable. About 40,000 tons are said to have been smelted at the Woodstock works while in operation, the resulting metal being remarkable for its great hardness and strength, and admirably adapted for the manufacture of steel. It contains a considerable percentage of manganese.

COPPER.

Sulphurets of Copper.

Salmon River, Albert County.—*a*. Grey sulphuret of copper.
Adams Island, Charlotte County.—*a*. Grey sulphuret.
Grand Manan Island.—*a*. Grey and yellow sulphuret.

Ores of Copper, in more or less considerable quantities, have been observed at a large number of different localities in New Brunswick. The greater portion of these, as well as those which appear to be most promising, are found in connection with a band of rocks extending along nearly the entire southern coast of the Province, but of which the exact age is still undetermined. They consist for the most part of slates of a micaceous or talcoid aspect and of green, reddish and purplish colors, but include also many coarser beds, together with chloritic schists and diorite, the copper ores being usually in veins which are calcareous or silicious, but sometimes disseminated in lumps or grains in layers of the slate, forming *fahlbands*. Attempts have been made at several points to work these ores, but have, so far, met only with a limited success, the mineral, though widely distributed and occasionally occurring in masses of remarkable

richness, not appearing, so far as yet ascertained, to be anywhere sufficiently concentrated to repay the cost of its extraction. A specimen from Salmon River is said to have yielded to analysis 62 per cent. of Copper.

MANGANESE.

Black Oxide of Manganese.

Markhamville, King's County, Alfred Markham, Esq.—Specimens of Pyrolusite and Manganite.

Deposits of Black Oxide of Manganese consisting chiefly of pyrolusite but associated with more or less of manganite, are not of uncommon occurrence in connection with the rocks of the Lower Carboniferous formation, and have been mined to a greater or less extent at several points, such as Markhamville, Quaco and Shepody Mountain. At each of these localities the mineral is met with in connection with limestones lying at or near the base of the series, being distributed through the latter partly in the form of veins but chiefly in irregular masses or "pockets," some of which are of remarkable purity.

The most important deposits which are being at present worked are those of Markhamville, under the direction of the Victoria Manganese Company. These were first opened in 1863, since which time the whole amount of ore removed has been about 6000 tons, the annual production varying from 500 to 1500 tons. Owing to the distance of the mines from railway transport, eleven miles, the ore is subject to a cartage of $3.00 per ton, but notwithstanding this drawback is profitably worked, the price at Sussex varying according to the quality, from $15.00 to $50.00 per ton.

Manganese is also met with to a limited extent in rocks more ancient than those of the Lower Carboniferous formation, as in slates which are probably of Silurian age, near Bathurst, and in those of the Huronian system in King's County; and it is probably from these in part that the ores above described have been derived as secondary products.

ANTIMONY.

Stibnite or Antimony Glance.

Parish of Prince William, York County.—Lake George Mining Company and *Geological Survey.*

The occurrence of Stibnite, or Grey Sulphuret of Antimony, at Prince William, seems to have been known for a number of years, but attracted little attention until about the year 1862, when fresh discoveries indicating a considerable body of ore having been made, several companies were formed with a view to its development. Through the explorations of the latter the mineral was found to be more or less abundantly spread over an area of several square miles, occurring chiefly in white quartz veins or veins of quartz and spar, intersecting hard clay slates and sandstones of undetermined age. These veins vary in thickness from a few inches to six feet, the ore being irregularly distributed through the quartz in strings or veinlets, sometimes attaining a thickness of twelve to fifteen inches. A large portion of the ore hitherto raised has been obtained within a short distance of the surface by means of trenches dug on the course of the lodes, but several shafts have also been sunk, attaining the depth of one hundred feet or more. In connection with these on the property of the Lake George Mining Company, somewhat extensive works have been erected, embracing an 80 horse-power engine, a 30 horse-power air compressor engine, a Burleigh steam drill, Blake's crusher, rollers, jiggers, &c., as well as furnaces for desulphurization and smelting. From these, when in full operation, 15 tons of metal were obtained about every six weeks; the charges (of 500 cwt.) yielding from 45 to 55 per cent. of regulus. The fluxes employed are charcoal, soda or salt cake and rosin. The value of the metal on the ground is 12 to 14 cts. per lb. It is partly exported in cakes or ingots to the United States (being valued in Boston at $12.25 to $12.75, gold, per ton,) and partly employed on the ground in the manufacture of Babbit Metal, (containing 15 to 20 per cent. of Antimony with lead and tin, or in the better qualities with lead, copper and tin,) valued at from 20 to 50 cts. per pound.

GYPSUM.

1. Hillsboro, Albert County.—Albert Manufacturing Company.
   - *a.* Crude Gypsum, large block.
   - *b.* Prepared Gypsum, ground for land.
   - *c.* " " " " stucco, raw.
   - *d.* " " " " " calcined.
   - *e.* Alabaster.
   - *f.* Anhydrite.
   - *g.* 4 blocks (6 inch cubes) of various qualities.
2. Petitcodiac, Westmorland County.—Amasa Brown.
   - *a.* Crude Gypsum, (fibrous.)
   - *b.* Prepared " ground for land.
   - *c.* Selenite.
3. Tobique River, Victoria County.—John Edgar.
   - *a.* Crude Gypsum.

The deposits of Gypsum occurring in New Brunswick are wholly confined to the Lower Carboniferous formation, and are both numerous and extensive. The largest deposits at present known are those of Hillsboro in Albert County, where extensive quarries have been opened and whence enormous quantities have been and are still being removed for calcination and exportation. The mineral is usually met with in very irregular masses associated with red sandstones, marls and limestones, at or near the summit of the series, and exhibits also much diversity of characters. At Hillsboro, in the quarries now being worked, there is exposed a total head of rock of from 90 to 100 feet, about 70 of which is composed of "soft plaster" or true gypsum, which rests on beds of hard plaster of unknown depth. At the same point thick masses of a very beautiful snow white alabaster are also met with associated with the varieties named above, but comparatively little selenite; while at Petitcodiac, where the deposit has a breadth of about 40 rods and a total length of about one mile, the whole is fibrous and highly crystalline, and traversed by a vein of nearly pure selenite eight feet wide, through its entire extent.

At most of the localities the deposits of gypsum are simply employed for local use, or at most only ground for application

to the land, but at Hillsboro extensive works both for grinding and for calcination have been erected, and with the exception of a short cessation consequent upon their destruction by fire, have been in continuous operation since the year 1861. Their present productive capacity is about 600 bbls. per diem, giving employment, in the quarries and mills, to about 100 hands.

The price of the Hillsboro plaster, crude, ground, is at present 65 cts. per bbl. (duty free); the calcined $1.00 per bbl., subject, in the United States, to a duty of 20 per cent.; that of Petitcodiac (delivered at the station of the Intercolonial R. R.,) is 70 cts. per bbl. or 40 cts. in bulk.

The following is a statement of the work accomplished at Hillsboro during the season of 1875:—

Plaster quarried, in tons,.....	129,000
" shipped in rock, in tons,.....	5,500
" ground and calcined in bbls.,.....	47,200
" " for farming, " "	800

Materials applicable to the Generaton of Heat and Light.

BITUMINOUS COAL.

Grand Lake (representing maximum thickness of the bed.)

Queens and Sunbury Coal Mining Company.

More than a third of the province of New Brunswick is occupied by rocks of the Coal formation, which present the usual variety of conglomerates, sandstones and shales, met with in other coal regions, together with numerous and characteristic fossil remains. Seams of coal are also met with at various points, but so far as at present known, are all of inconsiderable thickness, only one, that of Grand Lake, attaining a thickness (22—26 inches) sufficiently great to be capable of working. Being however, usually nearly or quite horizontal, such beds as do occur cover considerable areas, and when sufficiently near the surface are readily removed. For the same reason but little information can be obtained from the surface as to the possible occurrence of thicker beds beneath, and it is necessary to resort to borings in order to prove the latter. The results so far obtained in this direction are certainly unfavorable to the

existence of any such beds, or even to the probability of any great thickness to the coal formation as a whole in this region, but the latter being unconformable to the older beds upon which it rests, and these being highly disturbed, forming troughs and ridges beneath the carboniferous rocks, it is possible that the latter may really at some points attain a much more considerable thickness and include workable beds of coal.

The only locality in which mining operations for this mineral are at present conducted, is in and about the Newcastle River and the shores of the Grand Lake, in Queens County. The beds here having a thickness of about two feet, are usually met with within ten or fifteen feet of the surface, and have been removed at a great number of points over an area of over one hundred square miles, indicating a total productive capacity of about 154,948,147 tons. The coal is a true bituminous coal of the caking variety, and is employed both for household and blacksmiths' use. The total annual production is at present about 3000 chaldrons, which, delivered in the City of St. John, is sold, according to quality, from $4.50 to $8.00 per chaldron.

BITUMINOUS SHALE.

Albert Mines.—*Geological Survey.*

The Bituminous Shales or pyroschists from which the above specimens were taken are found at or near the base of the Lower Carboniferous formation in Albert county, and appear to be a somewhat local deposit, not being represented in connection with the rocks of the same formation in other portions of the Province. They are most conspicuous in the vicinity of the celebrated Albert mine, near Hillsboro', of which they form the enclosing rocks, and thence extend in two more belts both to the eastward and westward of that locality, having a total length of over fifty miles, and a thickness which is as yet undetermined. The Shales are of a remarkably tough, dense and fine-grained character, with a considerable admixture of calcareous matter, and, especially when rubbed, with a strongly bituminous odor. Their inclination is at some points low, but at others highly inclined or even vertical, with numerous and abrupt corrugations. It is at these latter points that they appear to be most highly

bituminous, and contain veins of albertite as well as small quantities of petroleum.

Attempts to employ these Shales for the manufacture of oils, have been made at various times, and somewhat extensive works for the purpose were erected at Baltimore, a few miles distant from the Albert mines, but after several years, operations were abandoned in consequence of the heavy import duties imposed upon such products in the United States, and the competition with the natural oils then being developed in that country. Their yield of oil was somewhat variable, but that of the best bed used at Baltimore was sixty-three gallons per ton. The same Shales were capable of yielding 7,500 feet per ton, of gas. In the year 1865, about 2000 tons were removed from similar beds in the county of Westmoreland, and exported to the United States, selling in that market at the rate of $6.00 per ton.

ALBERTITE.

Albert Mines.—Albert Mining Company, J. Byers, Esq.

This remarkable mineral, occuring in connection with the calcareo-bituminous shales or pyroschists above described, was first discovered by accident about the year 1850, and has been by some regarded as a true coal, by others as a variety of jet, and by others again as more nearly related to asphaltum. It resembles the latter closely in appearance, being very black, brittle and lustrous, with a broad conchoidal fracture, and like asphaltum is destitute of structure, but differs in fusibility and in its relation to various solvents. From the true coals it differs in being of one quality throughout, in containing no traces of vegetable tissues, and in its mode of occurence, which is that of a *vein* and not that of a true bed. This vein occupies an irregular and nearly vertical fissure, has a varying thickness of from one inch to seventeen feet, and has been mined to a depth of 1162 feet. The accompanying shales are in some portions abundantly filled with the remains of fossil fishes, (*Palæoniscus*) and it is not improbable that it was from these, in part at least, that the mineral was derived, existing perhaps at first in a fluid condition (in which state it has in some instances become the cementing material of conglomerate), and subsequently hardened

into its present form. Vegetable remains are almost entirely wanting.

Since the first discovery of the Albert mines, the amount of the mineral removed and exported has been very large, as will appear from the following table.

SHIPMENTS OF ALBERTITE:

In 1863,	18,600	Tons.
" 1864,	19,300	"
" 1865,	20,500	"
" 1866,	20,500	"
" 1867,	17,000	"
" 1868,	12,400	"
" 1869,	17,000	"
" 1870,	6,000	"
" 1871,	5,500	"
" 1872,	5,000	"
" 1873,	6,000	"
" 1874,	7,000	"
Total,	154,800	tons.

The royalty paid to the Government upon the above product, up to the 1st of January, 1866, was $8,089,29. The mineral was exported to the States, partly for the manufacture of oil and partly for admixture with other coals in the preparation of illuminating gas. For either of these purposes it is admirably adapted, being capable of yielding 100 gallons of crude oil or 14,500 cubic feet of gas per ton, of superior illuminating power. When employed with other coals it also leaves as a residuum a valuable coke. The price at which it has been sold has varied at different periods from $15,00 to $20,00 (gold) per ton. The number of men at present employed in connection with the works is about 120. The freight to Boston is $2.00 or to St. John $1.00 per ton.

MINERALS APPLICABLE TO COMMON AND DECORATIVE CONSTRUCTION.

BUILDING STONES.

Syenite.—St. George, Charlotte County.

a. A foot cube of red syenite, dressed and polished.—Bay of Fundy Red Granite Company.

Granite.—Hampstead, Queens County.—*Geological Survey.*

a. A foot cube of granite, dressed and polished.

Granites and syenites, of several different shades of color and varieties of texture, occur in New Brunswick and cover extensive areas. They are mostly if not wholly of intrusive origin, but appear to represent at least two very distinct periods of intrusion, the rocks of the one, characterized, usually, by grey and dark grey colors, and containing more or less hornblende and not unfrequently magnetic oxide of iron disseminated in grains, having been probably intruded at least as early as the Lower Silurian era; while the other, varying from pale pink to tawny yellow or bright red and usually more or less porphyritic, is probably of Devonian age. Rocks of both these types yield good building materials, but it is in the latter that the principal quarries have been opened. Until recently the grey rock alone was removed and was simply employed within the Province for ordinary constructive purposes, but the introduction of processes for polishing such rocks, together with a growing demand for brightly colored granites similar to those of Scotland, caused attention to be directed to the quarrying and manufacture of the red variety. Of this, extensive beds, forming a portion of the Nerepis range of hills, occur in the County of Charlotte, and have been opened in the vicinity of the town of St. George, on the Magaguadavic River. There is here every facility for the removal and working of the stone, blocks of any size up to thirty or forty feet in length and four or five in thickness, being easily obtainable, while in the falls of the stream above mentioned is an almost illimitable water power, available at all seasons for its transport and manufacture. Works erected at this spot about three or four years ago by the Bay of Fundy Red Granite Co., now give employment to about 110 men, the water power at present in use, with a single wheel, being equal to about 240 horse power.

SANDSTONES.

1. Budreau Village, Parish of Dorchester, Westmoreland.—Dorchester Union Freestone Co.

a. Two 1-foot cubes of sandstone, dressed.

2. Rockland, Dorchester.—Caledonia Freestone Company.
a. Two foot cubes of sandstone, dressed.
3. Mary's Point, Hopewell, Albert.—Messrs. Roberts & Co.
4. Shepody Mount, Hopewell, Albert.—Hopewell Quarry Co.

The specimens from the above localities, 1—4, are all derived from the Mill stone Grit formation, or lower member of the true Carboniferous system as represented in New Brunswick and Nova Scotia. This stone, commonly known in the United States as Nova Scotia stone, has been long known and highly prized, the Budreau quarries having been first opened in the year 1856, since which time there has been shipped from that locality an annual amount of from 5000 to 7000 tons. The Caledonia quarries were first opened in 1864 and now ship annually from 4000 to 6000 tons, while large quantities are also removed from the other localities mentioned above.

The particular qualities for which these stones are prized are their color, the facility with which they may be cut, dressed or ornamented, and their durability. The prevailing color in the Dorchester quarries is a yellowish or olive grey, shading on the one hand into a chocolate brown and on the other into a bluish grey, while at Mary's Point a portion of the rock is a pale, purplish red, the latter being the most abundant and most durable. The workable beds vary from two to six feet in thickness, and blocks can readily be obtained of any size up to a length of 30 feet or a weight of 20 tons. As a rule they contain little or no pyrites, and after seasoning by wetting and exposure, are unaffected by frost. Portions of the rock also yield good grindstones, being moderately soft but with a clear sharp grit.

The price of the ordinary building stone averages in Boston $15.00 (gold) per ton (=17 feet,) the freight being $2.50 to $4.00 per ton, and the duty $1.50.

WM. PARKS & SON,

MANUFACTURERS OF

Cottons, Cotton Yarns, Carpet Warps,

&c., &c.

SAINT JOHN, NEW BRUNSWICK,

CANADA.

Saint Martins Bobbin and Spool Co.,

Manufacturers of every description of

BOBBINS, SPOOLS,

Brush Stock, Tassel and Button Moulds,

WOOD TURNING, FURNITURE AND GENERAL WOOD WORK.

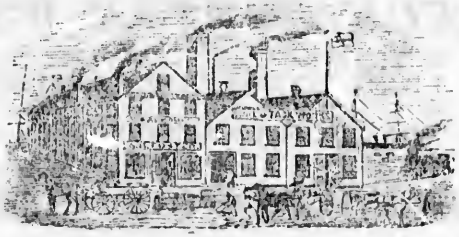
St. Martins, New Brunswick,

JAS. PATTINSON, MANAGER.

S. R. FOSTER & SON,

MANUFACTURERS OF

CUT NAILS AND



COIL SPIKES.

ALL KINDS OF SHOE NAILS, TACKS AND BRADS.

SAINT JOHN, N. B.

ALSO, PATENTEES OF FOSTER'S AUTOMATON FIRE-PROOF SHUTTERS.

MANUFACTURES

OF THE

MISPECK MILLS,

SAINT JOHN, NEW BRUNSWICK,

CANADA.

MISPECK FINGERING,

AND OTHER SUPERIOR

KNITTING YARNS,

3 AND 4 PLY, IN ALL THE USUAL COLORS, MANUFACTURED FROM THE BEST NATIVE WOOLS, AND WARRANTED TO BE EQUAL IN DURABILITY TO ANY YARN MANUFACTURED.

MISPECK COTTON WARPS,

WHICH HAVE ATTAINED THE VERY HIGHEST CHARACTER THROUGHOUT THE

MARITIME PROVINCES.

J. L. WOODWORTH. Agent,

SAINT JOHN, N. B.

SAINT JOHN

Slate Mantel Marbleizing Works,

Salesroom--83 PRINCE WM. STREET,

SAINT JOHN, N. B.

WILSON, GILMOUR & CO.,

MANUFACTURED IN ST. JOHN

BY WILSON, GILMOUR & CO.

MANUFACTURERS OF

MARBLEIZED SLATE MANTLES

AND DEALERS IN

COOKING, HALL AND PARLOR STOVES,

REGISTER GRATES, RANGES, &c.

The CELEBRATED MEDALLION PORTABLE RANGE a Specialty.

Not a Centennial, but only Ten years.

IN THE YEAR 1866,

MANCHASTER, ROBERTSON & ALLISON

Commenced business in a small store, only ten feet wide, on Prince Wm. Street, St. John, New Brunswick. Their importations at that time consisted chiefly of the finer classes of Dry-Goods, making a specialty of Silks, Velvets, Irish Poplins, Shawls, Real Laces, French Kid Gloves and Gentlemen's Furnishing Goods.

Their goods gave such great satisfaction, that at the end of one year they were obliged to remove to more extended premises, on the Market Square, where they remained six years, and three years ago took possession of their present Establishment, on King Street. The building is forty feet front, one hundred feet deep, and four stories high, the two lower flats of which are occupied for the Retail branch of their business.

Their Stock, which is personally selected by the firm, consists of a general assortment of First-class

DRY GOODS,

Millinery, Fancy Goods,
Gentlemen's Furnishing Goods, &c.

The Manufacturing Departments

ON THE PREMISES ARE

Dress, Costume and Mantle Making,
Millinery and Shirts.

☞ All of which are under experienced management.

SAINT JOHN, NEW BRUNSWICK,

MAY 1876.

THE YEAR OF THE CENTENNIAL.

ADVERTISEMENT.

THE CALEDONIA
Free Stone Quarry Company,

ROCKLAND, WESTMORLAND COUNTY,

NEW BRUNSWICK.

HEAD OFFICE IN MONTREAL.

THOMAS CRAMP, Esq., President.

DIRECTORS:

C. J. Brydges, Esq.
Thos. Wolferston Thomas, Esq.
Frank Bond, Esq.
Kenneth McDea, Esq.
Alex. Molson, Esq.
John Molson, Esq.
E. A. Bond, Esq.
T. W. Daniel, Esq.
John Boyd, Esq.

The Stone fomr this Quarry is of a pure olive shade, fine even grain, and has found very much favor in the markets of New York, Boston and other Cities. It has given general satisfaction, and stands almost unrivalled for its many points of excellence.

Orders for any quantity filled with promptness and despatch, on application to

THOMAS M. MacKELVIE, Manager.

ROCKLAND,

Westmorland, New Brunswick.

C 104 074

Albert Manufacturing Company

HILLSBOROUGH, ALBERT CO.

NEW BRUNSWICK.

JOS. T. TOMKINS, General Agent.

Manufacturers and Dealers in

CALCINED

PLASTER OF PARIS

—AND—

GROUND FARMERS' PLASTER.

The maunfactures of this company are well and favorably known throughout the United States, and the Plaster of Paris used in the interior decorations and finish of the *Centennial Memorial Hall*, at Philadelphia, was supplied by this company through Messrs French, Richards & Co., Philadelphia.

JAMES. S. MAY,

84 Prince William Street,

SAINT JOHN, N. B.

IMPORTER OF

West of England Broadcloths,

ENGLISH & SCOTCH SUITINGS,

MADE UP IN THE LATEST

LONDON AND NEW YORK STYLES.

☞ *Specimens of my manufacture are now on Exhibition at Philadelphia.*

N. B.—As I employ a large number of first-class workmen I am prepared to execute orders for the travelling public at the shortest possible notice.

FAIRBANKS & HAWES,

WOOD MOULDING & PLANING MILL,

PORTLAND, SAINT JOHN, N. B.

Every description of finish required in House or Ship work, Stair Railing, Newal Posts, Stair Banisters and all kinds of Wood Turning.

All kinds of Job Sawing, Planing, Jig Hand-Sawing, Doors, Sashes and Blinds made to order. Black Walnut, Black Ash, Pine and Spruce Lumber for sale and cut to order.

CLIMO'S
Scenery of New Brunswick
IN
STEREOSCOPIC VIEWS.

These Views have taken first premiums wherever shown. They embrace the most prominent points of interest, and objects of great natural beauty, from a wider field than ever before attempted. $1.50 per dozen. Trade supplied.

PORTRAIT PHOTOGRAPHS.

Card and Cabinet Photographs a specialty. Extreme care by skillful artists has been the cause of our great success in this department. Our prices are the most liberal known.

AMERICAN GALLERY,

101 GERMAIN STREET, OPPOSITE TRINITY CHURCH,

SAINT JOHN, N. B.

TROUT AND SALMON FLIES FOR CANADIAN WATERS, TIED BY A PRACTICAL FISHERMAN.

COPPER MINES

—OF—

LE ETETE, CHARLOTTE COUNTY,

NEW BRUNSWICK.

200 acres of Copper Claim shewing quartz Lead of 4 feet 8 inches wide, and cross seam from 7 to 9 feet sulphate of Copper. Specimens now on exhibition at Centennial.

For sale, apply to

JAMES McLEAN, Le Etete.
JAMES C. MADIGAN, Houlton, Maine.
THOMAS R. JONES, St. JOHN, N. B.

1828. ESTABLISHED 1828.

J. HARRIS & CO.,

SAINT JOHN, N. B.

NEW BRUNSWICK FOUNDRY & RAILWAY CAR WORKS,

Manufacturers of all kinds of

STEAM ENGINES & MILL MACHINERY,

THE IMPROVED LOWELL TURBINE WATER WHEELS.

SHIP CASTINGS, AGRICULTURAL IMPLEMENTS

RAILWAY CARS OF EVERY DESCRIPTION, CAR WHEELS.

PORTLAND ROLLING MILL, Straight Shore, Portland,

Tapered and Paralled Bars for ships' Knees, Nail Plate, Hammered Railway Car Axles, Shafting, and Shapes of all kinds.

J. R. CAMERON & CO.,

WHOLESALE AND RETAIL DEALERS IN

OILS, LAMPS, CHIMNIES,

&c., &c.

33 PRINCE WILLIAM STREET,

(Sand's Arcade,)

Saint John, N. B.

SAINT JOHN LAST FACTORY,

ESTABLISHED 1848.

Manufacturers of

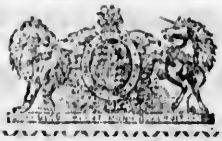
Boot Trees, Crimps and Lasts

of all kinds. Wholesale and Retail.

Office and Factory,--St. Patrick Street, near Union St.,

SAINT JOHN, N. B.

CLERKE & CO.

Under Royal  Patronage.

THE "WAVERLEY" HOUSE,

78 King Street, Saint John, N. B.

THIS HOUSE HAS BEEN PATRONIZED BY

H. R. H. PRINCE OF WALES, H. R. H. PRINCE ALFRED, H. R. H. PRINCE ARTHUR.
By all the British American Governors, and by the English Nobility and Gentry, as well as by the most distinguished Americans, Provincial Gentry and others, whom business or pleasure may have brought to St. John,

WHO HAVE JOINED IN PRONOUNCING IT

THE FAVORITE HOUSE OF THE PROVINCES.

The Proprietor, thankful for past favors, would respectfully intimate to the Travelling Public that he will spare no pains or expense to render the House still further deserving their patronage.

JOHN GUTHRIE, Proprietor.

ROYAL HOTEL,

146 Prince William Street,

Opposite Custom House,

ST. JOHN, N. B.

T. F. RAYMOND, Proprietor.

DINGEE SCRIBNER,

MANUFACTURER OF

SALMON and TROUT RODS,

SALMON AND TROUT FLIES,

CASTING LINES, LANDING NETS, GAFFS, &c.

IMPORTER AND DEALER IN

FLY BOOKS and REELS OF THE MOST APPROVED PATTERNS,

And every outfit necessary for Sportsmen.

Waterloo Street, - - St. John, N. B.

☞ Trout and Salmon Rods made to order and repaired at short notice.

VIVIAN W. TIPPET,

COMMISSION MERCHANT,

—AND—

GENERAL DEALER,

OPPOSITE PEOPLES' BANK,

Fredericton, N. B.

HENRY GRENDON TIPPET,

COMMISSION MERCHANT AND FORWARDING AGENT,

17 WATER STREET,

LIVERPOOL.

Represented in St. John, N. B., by
ARTHUR P. TIPPET.

ARTHUR P. TIPPET,

Manufacturers' and Importers' Agent

—AND—

BROKER,

OFFICE AND SAMPLE ROOM:

5 MARKET SQUARE, ST. JOHN, N. B.

THE DAILY TELEGRAPH,

AND

WEEKLY TELEGRAPH,

Are by far the most widely circulated papers in the Maritime Provinces, and are found in nearly every town and settlement in New Brunswick, Nova Scotia, and Prince Edward Island, as well as in other parts of Canada, and in the principal Atlantic cities and towns of the United States. The *City circulation of the Daily Telegraph* is larger than the total issue of several Maritime Dailies. The postage paid by the DAILY AND WEEKLY TELEGRAPH sent by mail, as appears by the Official Report, is nearly as much as that paid by all the other papers in St. John, fourteen in number.

THE DAILY TELEGRAPH is published every day except Sunday, at St. John, New Brunswick, and will be sent by mail, post paid, at 50 cents a month, or $6 a year, in advance. To pastors of Churches, teachers, postmasters, and telegraph operators, the DAILY TELEGRAPH will be mailed, or delivered by carriers, at a discount from the above rate.

THE WEEKLY TELEGRAPH is published at $1.20 a year, in gold, in advance. It is mailed, *postage paid*, to the United States for $1.50 U. S. Currency.

These papers furnish the

Best Advertising Medium in the Maritime Provinces.

Advertisements are Inserted at the Most Moderate Rates.

☞ For terms and other particulars apply to

WILLIAM ELDER,
Editor and Proprietor,
ST. JOHN, N. B.

NEW BRUNSWICK'S WOOD TROPHY

For the Colonial and Indian Exhibition, now on View at Messrs. Howe's Warerooms—A Great Success Artistically and Otherwise.

If one may judge by the numerous exclamations of surprise and pleasure from the visitors at Messrs. Howe's warerooms on Saturday as the wood trophy was nearing completion, it is undoubtedly a success both artistically and from a more practical commercial point. It will no doubt form

THE CHIEF FEATURE

in the New Brunswick display at the exhibition. Much uncertainty was felt as to the effect of this undertaking, but it is gratifying to note that it has surpassed the most sanguine expectations. A more pleasing combination of nature and art could not be well devised, considering the limited grant and the shortness of the time allowed for completion. It has also been an object in this case to economize space and the largest display has been made in the smallest space possible, endeavoring to combine every natural condition of the wood as well as every artificial application.

THE MAIN PORTION OF THE TROPHY

embraces all the larger or commercial woods, which are sufficiently abundant to form an important item for trade. These are divided into three sections. The right wing comprises the evergreen or coniferous specimens, including hemlock, red and white pine, black and white spruce, hackmatack, cedar and fir. The central section is made up of the dense woods, such as the black and white birch, rock and scarlet maples and beech. The left wing consists of black and white ash, red and gray oak, elm, butternut, bass-wood and poplar. At the base of each of these fifteen large panels there is a log of the same wood, 20 inches in diameter and 3 feet 1 inch in height, while the sides of the panels are formed of saplings or young trees of the same woods, resting upon turned bases and surmounted by carved capitals representing the foliage and fruit or flower of these trees. These again are surmounted by a scroll saw and carved bracket, all of the same wood as corresponding panel.

Between the large panels and the logs an incline

Mr. George Lister, an experienced woodsman of Southampton, York County, contributed many of the small woods. The carved capitals on the upper portion of the columns, or young trees, are the work of Edwin F. Fraser, John Mogerson, Lawrence Barry and Silas Hoyt.

THE ORIGINAL IDEA,

as well as the design and construction, is due to the establishment of Messrs. J. & J. D. Howe, furniture manufacturers, of this city. It may not be

panels is framed with strips showing the bark and the corners are transverse sections showing the end grain. The aim of the whole design is to

SHOW THE WOODS IN ALL FORMS,

which will interest practical wood-workers; therefore the combination in the large panels shows the slash and rift of the grain, as well as an end section showing the density of the grain, annual growth, depth of sap, bark, etc. These last named sections or quarters shown at the base of the panels also convey a better idea of the size of the growth of these woods being taken from more fully developed trees.

The cornice which surmounts these panels forms a very pleasing feature in the structure, and is composed principally of bark and specimens of each wood in mouldings. Above the central section is placed a poplar board with ebonized letters bearing the words "Woods of New Brunswick, Canada." The whole of the top will be surmounted by

STUFFED SPECIMENS OF THE BEST GAME

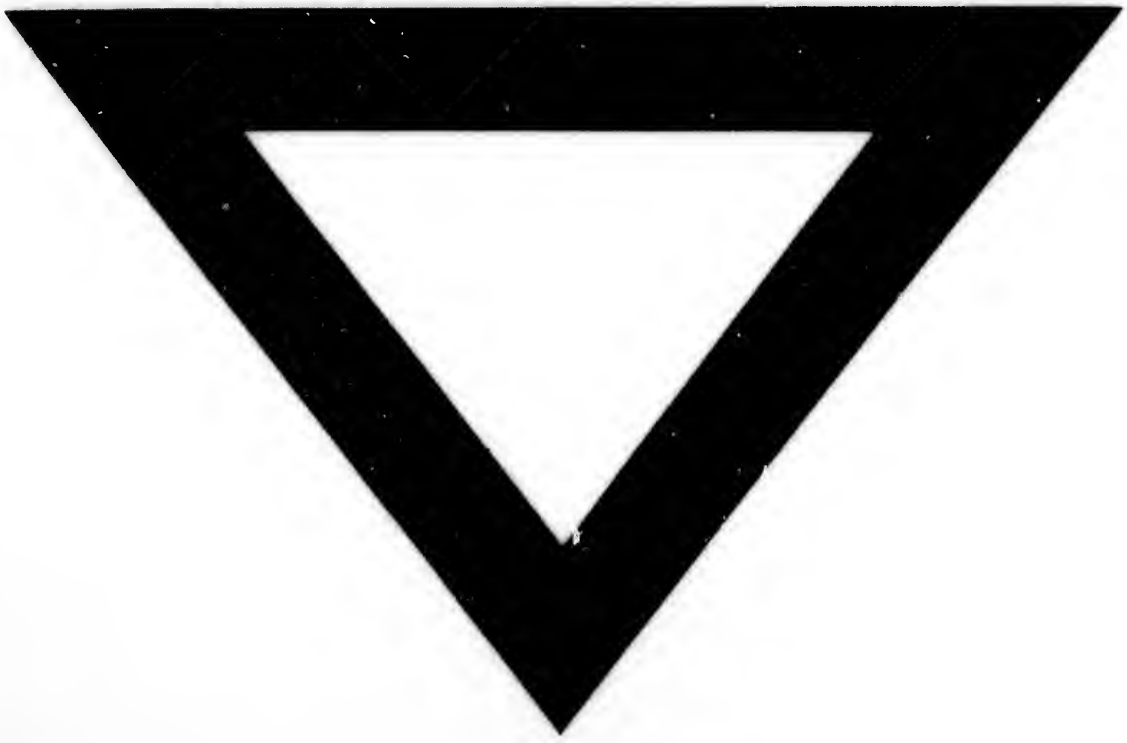
of our forests, which is now being prepared by Mr. J. H. Carneil. A fine moose head will ornament the centre, with a caribou head on the right wing and a red deer head on the left wing. Foxes, coons, beaver, porcupine, partridge, etc., are to be added. All of the panels, as well as much of the surrounding woodwork, have been highly polished, showing the capabilities of the woods in their different applications in the arts and manufactures.

An important point in the close grained woods, and those free from resinous tendencies, is their adaptability for staining, and, to illustrate this, oblique bars have been stained across the tops, showing the effect of satin wood, cherry, mahogany, walnut, rosewood and ebony stains.

OTHER DECORATIONS.

The foliage, flowers and fruit have been beautifully painted on both large and small panels, by Mr John C. Miles, A. R C. A., and the work does him infinite credit, although laboring under numerous disadvantages as to hurried work and difficulty in obtaining appropriate specimens to work from. This forms the most attractive feature, from an artistic point of view, and will be a very valuable addition in other ways. So near do the pictures approach nature that many have expressed doubts as to their being painted, and thought them the original foliage.

Messrs Geo. F. Matthew and Geo. U. Hay, of the Natural History Society of New Brunswick, rendered valuable assistance in the botanical arrangements, etc., while the society kindly loaned the floral specimens. Mr. Jas. E. Wetmore also loaned his large private collection and otherwise assisted with valuable information. Several of the logs for the base were obtained by Mr. Gabriel Merritt, of Moss Glen, Kings county, showing that some fine timber still exists in the vicinity of this city. Mr. Thos. Crothers, of Upper Gagetown, Queens county, secured the handsome specimens of oak, elm and many of the smaller woods. Mr. Alex. Henderson, furniture manufacturer, of Woodstock, Carleton Co., also obtained some good samples.

out of place to mention that the grant, which was made jointly by the dominion and local governments, was only sufficient to cover the cost of collecting material and other expenses incurred. Therefore the work may be considered a donation from Messrs Howe, who have spared no pains or expense to insure the best results and have utilized the best talent in every department. The firm express themselves as most gratified at the hearty spirit shown by all interested in endeavoring to make it worthy of the province. Too much credit cannot be given to Hon. Mr. Blair and the local government for the spirited way in which they undertook this work even before assistance was secured from the dominion government.

From the "Daily Telegraph" of St. John N.B. March 8th 1886