

# *Skeleton to Freely Branched Mosses -- MidWest*

Revised through 12 January 2009

**Reminder:** a dagger (†) indicates that not all of the species within the given genus have the character(s) defining that Group.

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## ***Group P1 – Shoots strongly flattened (complanate) or angular***

**Group P1**

<i>Brachelyma</i>	<i>Homalia</i>	<i>Neckera</i>
<i>Brotherella</i>	<i>Homaliadelphus</i>	<i>Neckeropsis</i>
<i>Callicladium</i>	<i>Hookeria</i>	<i>Plagiothecium</i> †
<i>Callicostella</i>	<i>Isopterygiopsis</i>	<i>Porotrichum</i>
<i>Cyclodictyon</i>	<i>Isopterygium</i>	<i>Pseudotaxiphyllum</i>
<i>Entodon</i> †	<i>Lepidopilum</i>	<i>Racopilum</i>
<i>Fontinalis</i> †	<i>Leptodictyum</i> †	<i>Steerecleus</i>
<i>Herzogiella</i> †	<i>Metaneckera</i>	<i>Taxiphyllum</i>

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## ***Group P2 – Shoots julaceous (especially when dry) - shoots round with crowded, overlapping and appressed leaves***

**Group P2**

<i>Antitrichia</i> †	<i>Hedwigia</i>	<i>Pterogonium</i>
<i>Bryoandersonia</i>	<i>Myurella</i> †	<i>Scleropodium</i> †
<i>Cryphaea</i>	<i>Plagiobryum</i>	<i>Scorpidium</i>
<i>Entodon</i> †	<i>Pseudoscleropodium</i>	<i>Thelia</i>

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## ***Group P3 – Leaves spreading at right angles (suarrose) or squarrose-recurved***

**Group P3**

<i>Campylium</i> †	<i>Rhytidiadelphus</i>
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## ***Group P4 – Plants with erect branches from a creeping stem***

**Group P4**

<i>Bestia</i>	<i>Groutiella</i>	<i>Macromitrium</i>
<i>Drummondia</i>	<i>Jaegerina</i>	<i>Neomacounia</i>
<i>Forsstroemia</i>	<i>Macrocoma</i>	<i>Schlotheimia</i>

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**Group P5 – Plants with leaves sickle-shaped and turned to one side (falcate-secund)**

Group P5

<i>Brachythecium</i> <sup>†</sup>	<i>Hygrohypnum</i> <sup>†</sup>	<i>Pylaisiadelpha</i>
<i>Brotherella</i>	<i>Hypnum</i>	<i>Rhytidiopsis</i>
<i>Ctenidium</i>	<i>Limprichtia</i>	<i>Rhytidium</i>
<i>Dichelyma</i>	<i>Loeskypnum</i> <sup>†</sup>	<i>Sanionia</i>
<i>Drepanocladus</i> <sup>†</sup>	<i>Palustriella</i>	<i>Scorpidium</i>
<i>Gollania</i>	<i>Platygyrium</i>	<i>Sematophyllum</i>
<i>Hamatocaulis</i>	<i>Ptilium</i>	<i>Warnstorfia</i>
<i>Heterophyllum</i>	<i>Pylaisiella</i>	

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**Group P6 – Plants with paraphyllia or tomentum on stem**

Group P6

<i>Abietinella</i>	<i>Helodium</i>	<i>Pseudoleskea</i>
<i>Alsia</i>	<i>Hylocomiastrum</i>	<i>Rawiella</i>
<i>Bryohaplocladium</i>	<i>Hylocomium</i>	<i>Rhytidiopsis</i>
<i>Climacium</i>	<i>Lescurea</i>	<i>Thelia</i>
<i>Cratoneuron</i>	<i>Loeskeobryum</i>	<i>Thuidium</i>
<i>Cyrto-hypnum</i>	<i>Metaneckera</i>	<i>Tomentypnum</i>
<i>Dendroalsia</i>	<i>Palustriella</i>	

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**Group P7 – Plants with red stems**

Group P7

<i>Antitrichia</i>	<i>Hylocomium</i>	<i>Plagiobryum</i>
<i>Calliergonella</i>	<i>Hypnum</i>	<i>Pleurozium</i>
<i>Climacium</i>	<i>Loeskeobryum</i>	<i>Rhytidiadelphus</i>
<i>Hedwigia</i>		

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**Group P8 – Plants with shoots flat on top and appearing “braided”**

Group P8

<i>Brotherella</i>	<i>Hypnum</i> <sup>†</sup>	<i>Ptilium</i>
<i>Ctenidium</i>		

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**Group P9 – Leaves undulate or rugose (irregular undulations)**

Group P9

<i>Metaneckera</i>	<i>Rhytidiopsis</i>	<i>Schlotheimia</i> <sup>†</sup>
<i>Neckera</i> <sup>†</sup>	<i>Rhytidium</i>	<i>Scorpidium</i>

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**Group P10 – Leaves dimorphic (two forms on the same axis)**

Group P10

<i>Hypopterygium</i>	<i>Racopilum</i>	
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**Group P11 – Leaves with awns, hair-points, or hyaline apices**

<i>Braunia</i>	<i>Hedwigia</i>	<i>Racomitrium</i> <sup>†</sup>	<b>Group P11</b>
<i>Cirriphyllum</i>	<i>Iwatsukiella</i>	<i>Wijkia</i>	
<i>Claopodium</i> <sup>†</sup>	<i>Pseudobraunia</i>	<i>Zelometeorium</i>	

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**Group P12 – Plants thread-like (leaves < 1mm)**

<i>Homomallium</i>	<i>Platydictya</i>	<i>Pseudoleskeella</i>	<b>Group P12</b>
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**Group P13 – Costa double and more than 1/3 leaf length**

<i>Callicostella</i>	<i>Hylocomiastrum</i> <sup>†</sup>	<i>Plagiothecium</i> <sup>†</sup>	<b>Group P13</b>
<i>Cyclodictyon</i>	<i>Hylocomium</i>	<i>Pseudocalliergon</i>	
<i>Heterocladium</i> <sup>†</sup>	<i>Lepidopilum</i>	<i>Rhytidiadelphus</i> <sup>†</sup>	
<i>Hygrohypnum</i> <sup>†</sup>	<i>Loeskeobryum</i>	<i>Trachyxiphium</i>	

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**Group P14 – Costa single and narrow; leaves with distinct decurrencies**

<i>Anomodon</i> <sup>†</sup>	<i>Bryhnia</i>	<i>Heterocladium</i> <sup>†</sup>	<b>Group P14</b>
<i>Brachythecium</i> <sup>†</sup>	<i>Eurhynchium</i> <sup>†</sup>	<i>Pleuroziopsis</i>	

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**Group P15 – Costa single and narrow; leaves with a distinct marginal border**

<i>Brachelyma</i>	<i>Helodium</i> <sup>†</sup>	<i>Platylomella</i>	<b>Group P15</b>
<i>Daltonia</i>	<i>Limbella</i>	<i>Thelia</i>	
<i>Groutiella</i>			

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**Group P16 – Costa single and narrow; leaves with distinct alar cells**

<i>Bestia</i>	<i>Drepanocladus</i>	<i>Loeskypnum</i>	<b>Group P16</b>
<i>Brachythecium</i>	<i>Entodontopsis</i>	<i>Palamocladium</i>	
<i>Calliergon</i>	<i>Forsstroemia</i> <sup>†</sup>	<i>Palustriella</i>	
<i>Campylium</i> <sup>†</sup>	<i>Hygrohypnum</i>	<i>Pseudoscleropodium</i>	
<i>Clasmatodon</i>	<i>Isothecium</i>	<i>Sarmenthypnum</i>	
<i>Cratoneuron</i>	<i>Lindbergia</i>	<i>Stereophyllum</i>	

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**Group P17 – Costa short and double or none; leaves with distinct decurrencies**

<i>Herzogiella</i> <sup>†</sup>	<i>Heterocladium</i> <sup>†</sup>	<i>Plagiothecium</i>	<b>Group P17</b>
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**Group P18 – Costa short and double, or none; leaves bordered**

<i>Groutiella</i>	<i>Thelia</i>		<b>Group P18</b>
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**Group P19 – Costa short and double, or none; leaves with distinct alar cells**

Group P19

<i>Acroporium</i>	<i>Herzogiella</i> <sup>†</sup>	<i>Ptilium</i>
<i>Alsia</i>	<i>Heterophyllum</i>	<i>Pylaisiadelpha</i>
<i>Brotherella</i>	<i>Hygrohypnum</i>	<i>Pylaisiella</i>
<i>Callicladium</i>	<i>Hypnum</i>	<i>Rhytidiadelphus</i> <sup>†</sup>
<i>Calliergonella</i>	<i>Isopterygium</i>	<i>Scorpidium</i>
<i>Campylium</i> <sup>†</sup>	<i>Leptopterigynandrum</i>	<i>Sematophyllum</i>
<i>Donnellia</i>	<i>Leucodon</i>	<i>Taxiphyllum</i> <sup>†</sup>
<i>Entodon</i>	<i>Platygyrium</i>	<i>Tripterocladium</i>
<i>Forsstroemia</i> <sup>†</sup>	<i>Pleurozium</i>	<i>Wijkia</i>
<i>Gollania</i>	<i>Pterogonium</i>	

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**Group P20 – Costa of uncommon or variable form**

Group P20

<i>Alsia</i>	<i>Hygrohypnum</i>	<i>Platyhypnidium</i> <sup>†</sup>
<i>Antitrichia</i>	<i>Isothecium</i>	<i>Pseudocalliergon</i>
<i>Calliergon</i>	<i>Jaegerina</i>	<i>Pseudoleskeella</i> <sup>†</sup>
<i>Drepanocladus</i> <sup>†</sup>	<i>Leptopterigynandrum</i>	<i>Pseudoscleropodium</i>
<i>Donrichardsia</i>	<i>Myurella</i> <sup>†</sup>	<i>Taxiphyllum</i>
<i>Forsstroemia</i> <sup>†</sup>	<i>Neomacounia</i>	<i>Thelia</i> <sup>†</sup>
<i>Heterocladium</i> <sup>†</sup>	<i>Plagiothecium</i>	

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*Note:* In the following Groups, all possible genera are listed to give perspective on the Freely branched mosses. Only the genera **NOT in brackets [–]** are keyed out in Groups P21-P28; the genera in brackets should be identifiable using the criteria characteristic of the previous Groups.

*Reminder:* Definitions for cell length to breadth ratios are found in the Introduction, the Overview and at the end of this section.

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**Group P21 – Cells long (>8:1); distinctly papillose or prorulose**

Group P21

<i>Chryso-hypnum</i>	<i>Homalothecium</i> <sup>†</sup>	
[ <i>Hylocomium</i> ]	[ <i>Rhytidium</i> ]	[ <i>Taxiphyllum</i> ]

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**Group P22 – Cells long; smooth or indistinctly ornamented<sup>#</sup>;  
costa single (long and narrow)**

		Group P22
<i>Brachythecium</i> <sup>†</sup>	<i>Homalotheciella</i>	<i>Scleropodium</i> <sup>†</sup>
<i>Conardia</i>	<i>Homalothecium</i> <sup>†</sup>	<i>Stereocleus</i>
<i>Dichelyma</i>	<i>Leptodictyum</i> <sup>†</sup>	<i>Stereophyllum</i> <sup>†</sup>
<i>Eurhynchium</i>	<i>Platyhypnidium</i>	<i>Trachybryum</i>
<i>[Bryoandersonia]</i>	<i>[Entodontopsis]</i>	<i>[Pleuroziopsis]</i>
<i>[Calliergon]</i>	<i>[Hamatocaulis]</i>	<i>[Pseudoscleropodium]</i>
<i>[Campylium]</i>	<i>[Hygrohypnum]</i>	<i>[Sanionia]</i>
<i>[Cirriphyllum]</i>	<i>[Limbella]</i>	<i>[Sarmenthypnum]</i>
<i>[Drepanocladus]</i>	<i>[Limprichtia]</i>	<i>[Warnstorfia]</i>
<i>[Entodon]</i>	<i>[Loeskypnum]</i>	

<sup>#</sup> Cells indistinctly papillose, i.e., low papillae or projections.

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**Group P23 – Cells long; smooth or indistinctly ornamented<sup>#</sup>;  
costa double (long or short) or none**

		Group P23
<b>Costa long and double</b>		
<i>Loeskeobryum</i>		
<i>[Hylocomiastrum]</i>	<i>[Rhytidiadelphus]</i>	<i>[Trachyxiophium]</i>
<b>Costa short and double, or none</b>		
<i>Fontinalis</i>	<i>Isopterygium</i>	<i>Pseudotaxiphyllum</i>
<i>Herzogiella</i>	<i>Orthothecium</i>	<i>Taxiphyllum</i>
<i>Isopterygiopsis</i>		
<i>[Brotherella]</i>	<i>[Hylocomium]</i>	<i>[Pylaisiadelpha]</i>
<i>[Callicladium]</i>	<i>[Hypnum]</i>	<i>[Rhytidiadelphus]</i>
<i>[Calliergonella]</i>	<i>[Plagiothecium]</i>	<i>[Rhytidiopsis]</i>
<i>[Campylium]</i>	<i>[Pleurozium]</i>	<i>[Scorpidium]</i>
<i>[Gollania]</i>	<i>[Ptidium]</i>	<i>[Sematophyllum]</i>
<i>[Hygrohypnum]</i>		

<sup>#</sup> Cells indistinctly papillose, i.e., low papillae or projections.

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**Group P24 – Cells intermediate (3-8:1); distinctly papillose or prorulose**

Group P24

**Papillose**

*Barbella*  
*Henicodium*

*Papillaria**Taxithelium*[*Antitrichia*][*Helodium*]**Prorulose**

*Leptohyemium*  
*Lescuraea*<sup>†</sup>

*Pireella**Pterigynandrum*

[*Bryhnia*]  
[*Ctenidium*]  
[*Dendroalsia*]  
[*Helodium*]

[*Hylocomium*]  
[*Isothecium*]  
[*Porotrichum*]

[*Pterogonium*]  
[*Rhytidiadelphus*]  
[*Rhytidium*]

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**Group P25 – Cells intermediate; smooth or indistinctly ornamented<sup>#</sup>;  
costa single (wide or narrow)**

Group P25

**Costa wide**[*Donrichardsia*]**Costa narrow**

*Amblystegium*<sup>†</sup>  
*Anacamptodon*  
*Brachythecium*<sup>†</sup>  
*Dichelyma*  
*Eurhynchium*

*Fabronia*  
*Hygroamblystegium*<sup>†</sup>  
*Leptodictyum*<sup>†</sup>  
*Myuroclada*  
*Pireella*

*Pseudocryphaea*  
*Sarmenthypnum*  
*Scleropodium*  
*Trachybryum*

[*Brachelyma*]  
[*Calliargon*]  
[*Campylium*]  
[*Climacium*]  
[*Conardia*]  
[*Cratoneuron*]  
[*Daltonia*]  
[*Drepanocladus*]  
[*Forsstroemia*]

[*Hamatocaulis*]  
[*Homalia*]  
[*Hygrohypnum*]  
[*Jaegerina*]  
[*Limprichtia*]  
[*Metaneckera*]  
[*Palamocladium*]  
[*Palustriella*]

[*Plagiobryum*]  
[*Porotrichum*]  
[*Pseudoleskeella*]  
[*Sanionia*]  
[*Tomentypnum*]  
[*Warnstorfia*]  
[*Wijkia*]  
[*Zelometeorium*]

<sup>#</sup> Cells indistinctly papillose, i.e., low papillae or projections.

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**Group P26 – Cells intermediate; smooth or indistinctly ornamented<sup>#</sup>;  
costa double (long or short) or none**

Group P26

**Costa long and double***Heterocladium*<sup>†</sup>*[Hylocomiastrum]***Costa short and double, or none***Acroporium**Iwatsukiella**Pseudocalliergon**Bryocrumia**Orthothecium**Vesicularia****Fontinalis****[Alsia]**[Homomallium]**[Platygyrium]**[Campylium]**[Hygrohypnum]**[Pseudoleskeella]**[Donnellia]**[Hypnum]**[Pylaisiella]**[Entodon]**[Neckera]**[Sematophyllum]**[Forsstroemia]**[Neomacounia]**[Tripterocladium]**[Heterocladium]**[Plagiothecium]**[Zelometeorium]**[Heterophyllum]**[Platydictya]*

# Cells indistinctly papillose, i.e., low papillae or projections.

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**Group P27 – Cells short (<3:1); distinctly papillose or prorulose**

Group P27

**Papillose***Anomodon**Haplohymenium**Lindbergia*<sup>†</sup>*Braunia**Heterocladium*<sup>†</sup>*Myurella*<sup>†</sup>*Claopodium**Leskea*<sup>†</sup>*Racomitrium**[Abietinella]**[Cyclodictyon]**[Pseudoleskea]**[Hedwigia]**[Cyrt-hypnum]**[Raiiella]**[Bryohaplocladium]**[Leptopterigynandrum]**[Thelia]**[Callicostella]**[Pseudobraunia]**[Thuidium]***Prorulose***Heterocladium*<sup>†</sup>*Schwetschkeopsis**[Dendroalsia]**[Porotrichum]*

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**Group P28 – Cells short; smooth or indistinctly ornamented<sup>#</sup>**

Group P28

**Costa single, long and narrow.***Amblystegium*<sup>†</sup>*Bestia**Clasmatodon**Cryphaea*<sup>†</sup>*Herpetineuron**[Forsstroemia]**[Groutiella]**[Heterocladium]**[Hypopterygium]**[Isothecium]**Hygroamblystegium*<sup>†</sup>*Leptodon**Leskea*<sup>†</sup>*Leskeella**[Macrocoma]**[Macromitrium]**[Neckeropsis]**[Platylorella]**[Porotrichum]**Lindbergia*<sup>†</sup>*Myrinia**Racomitrium**Stereophyllum**[Pseudoleskeella]**[Racopilum]**[Schlotheimia]**[Thamnobryum]***Costa short and double, or none.***Iwatsukiella**[Donnellia]**[Drummondia]**[Forsstroemia]**[Homaliadelphus]**Myurella*<sup>†</sup>*[Hookeria]**[Lepidopilum]**[Leucodon]**[Neckeropsis]**Vesicularia**[Platydictya]**[Pseudoleskeella]**[Sematophyllum]*

<sup>#</sup> Cells indistinctly papillose, i.e., low papillae or projections.

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**Cells** = medial, laminal cells; cells ~2/3 of the way from insertion to apex, midway between the costa and the margin.

Length to breadth **ratios** of medial, laminal cells:

**Long** cells: >8:1; commonly termed linear or linear-flexuose.

**Intermediate** cells: 3-8:1; commonly termed elongated, oblong-rhomboidal, fusiform., or elliptical.

**Short** cells: <3:1; commonly termed isodiametric, quadrate, rounded-quadrate, or rhombic.

End.