

# *NE Skeleton to Freely Branched (mostly pleurocarpous) Mosses*

Revised through 17 May 2010

**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>Stereocleus</i>
<i>Herzogiella</i> †	<i>Metaneckera</i>	<i>Taxiphyllum</i>

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## *Group P2 – Shoots julaceous (both wet & dry) - shoots round with crowded, overlapping & appressed leaves*

Group P2

<i>Antitrichia</i> †	<i>Leucodon</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>
<i>Hedwigia</i>		

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## *Group P3 – Leaves spreading at right angles (squamose) 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>Drummondia</i>	<i>Jaegerina</i>	<i>Neomacounia</i>
<i>Forsstroemia</i>	<i>Macrocoma</i>	<i>Schlotheimia</i>
<i>Groutiella</i>	<i>Macromitrium</i>	

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

Group P5

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

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

<i>Abietinella</i>	<i>Helodium</i>	<i>Palustriella</i>	<b>Group P6</b>
<i>Alsia</i>	<i>Heterocladium</i> <sup>†</sup>	<i>Pseudoleskea</i>	
<b><i>Bryohaplocladium</i></b>	<b><i>Hylocomiastrum</i></b>	<b><i>Raiiella</i></b>	
<i>Claopodium</i>	<i>Hylocomium</i>	<i>Rhytidiopsis</i>	
<b><i>Climacium</i></b>	<i>Lescuraea</i>	<b><i>Thelia</i></b>	
<b><i>Cratoneuron</i></b>	<b><i>Leskea (often few paraphyllia)</i></b>	<b><i>Thuidium</i></b>	
<b><i>Cyrto-hypnum</i></b>	<b><i>Loeskeobryum</i></b>	<b><i>Tomentypnum</i></b>	
<i>Dendroalsia</i>	<i>Metaneckera</i>		

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**Group P7 – Plants with red stems**

<i>Antitrichia</i>	<i>Hylocomium</i>	<i>Plagiobryum</i>	<b>Group P7</b>
<b><i>Climacium</i></b>	<b><i>Hypnum</i></b>	<b><i>Pleurozium</i></b>	
<b><i>Hedwigia</i></b>	<b><i>Loeskeobryum</i></b>	<b><i>Rhytidiadelphus</i></b>	

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

<i>Brotherella</i>	<i>Hypnum</i> <sup>†</sup>	<i>Ptilium</i>	<b>Group P8</b>
<i>Ctenidium</i>			

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

<i>Metaneckera</i>	<i>Rhytidiopsis</i>	<i>Schlotheimia</i> <sup>†</sup>	<b>Group P9</b>
<i>Neckera</i> <sup>†</sup>	<b><i>Rhytidium</i></b>	<b><i>Scorpidium</i></b>	

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

<i>Hypopterygium</i>	<i>Racopilum</i>		<b>Group P10</b>
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**Group P11 – Leaves with awns, hair-points or hyaline apices**

<i>Braunia</i>	<b><i>Hedwigia</i></b>	<b><i>Racomitrium</i></b> <sup>†</sup>	<b>Group P11</b>
<b><i>Cirriphyllum</i></b>	<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>Campylophyllum</i>	<i>Platydictya</i>	<i>Pseudoleskeella</i>	<b>Group P12</b>
<b><i>Homomallium</i></b>			

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**Group P13 – Costa double & >1/3 leaf length**

Group P13

<i>Callicostella</i>	<i>Hylacomiastrum</i> <sup>†</sup>	<i>Pseudocalliergon</i>
<i>Cyclodictyon</i>	<i>Hylacomium</i>	<i>Rhytidiadelphus</i> <sup>†</sup>
<i>Heterocladium</i> <sup>†</sup>	<i>Lepidopilum</i>	<i>Trachyxiophium</i>
<i>Hygrohypnum</i> <sup>†</sup>	<i>Loeskeobryum</i>	

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

Group P14

<i>Brachythecium</i> <sup>†</sup>	<i>Heterocladium</i> <sup>†</sup>	<i>Pleuroziopsis</i>
<i>Bryhnia</i>		

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

Group P15

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

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

Group P16

<i>Brachythecium</i>	<i>Entodontopsis</i>	<i>Palamocladium</i>
<i>Calliergon</i>	<i>Hygrohypnum</i>	<i>Palustriella</i>
<i>Campylium</i> <sup>†</sup>	<i>Isothecium</i>	<i>Pseudoscleropodium</i>
<i>Cratoneuron</i>	<i>Loeskypnum</i>	<i>Sarmenthyphnum</i>
<i>Drepanocladus</i>		

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

Group P17

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

Group P18

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

Group P19

<i>Acroporium</i>	<i>Herzogiella</i> <sup>†</sup>	<i>Pterogonium</i>
<i>Alsia</i>	<i>Heterophyllum</i>	<i>Ptilium</i>
<i>Brotherella</i>	<i>Hygrohypnum</i>	<i>Pylaisiadelpha</i>
<i>Callicladium</i>	<i>Hypnum</i>	<i>Pylaisiella</i>
<i>Calliergonella</i>	<i>Isopterygium</i>	<i>Rhytidiadelphus</i> <sup>†</sup>
<i>Campylium</i> <sup>†</sup>	<i>Leptopterigynandrum</i>	<i>Scorpidium</i>
<i>Donnellia</i>	<i>Leucodon</i>	<i>Sematophyllum</i>
<i>Entodon</i>	<i>Platygyrium</i>	<i>Tripterocladium</i>
<i>Forsstroemia</i>	<i>Pleurozium</i>	<i>Wikia</i>
<i>Gollania</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 & at the end of this section.

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

		Group P21
<i>Bryhnia</i> <sup>†</sup>	<i>Chryso-hypnum</i>	<i>Homalothecium</i> <sup>†</sup>
[ <i>Hylocomium</i> ]	[ <i>Rhytidium</i> ]	[ <i>Taxiphyllum</i> ]
[ <i>Rhytidiadelphus</i> ]		

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

		Group P22
<i>Brachythecium</i> <sup>†</sup>	<i>Homalotheciella</i>	<i>Scleropodium</i>
<i>Conardia</i>	<i>Homalothecium</i> <sup>†</sup>	<i>Stereocleus</i>
<i>Dichelyma</i>	<i>Leptodictyum</i> <sup>†</sup>	<i>Trachybryum</i>
<i>Eurhynchium</i>	<i>Platyhypnidium</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> ]	

\*: Cells indistinctly papillose, i.e., low papillae, or prorulose.

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

Group P23

**Costa long & double***Loeskeobryum*[*Hylocomiastrum*][*Rhytidiadelphus*][*Trachyxiophium*]**Costa short & double, or none***Fontinalis**Orthothecium*[*Brotherella*][*Hylocomium*][*Ptilium*][*Callicladium*][*Hypnum*][*Pylaisiadelphus*][*Calliargonella*][*Isopterygiopsis*][*Rhytidiadelphus*][*Campylium*][*Isopterygium*][*Rhytidiopsis*][*Gollania*][*Plagiothecium*][*Scorpidium*][*Herzogiella*][*Pleurozium*][*Sematophyllum*][*Hygrohypnum*][*Pseudotaxiphyllum*][*Taxiphyllum*]

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

Group P24

**Papillose***Barbella**Papillaria**Taxithelium**Henicodium*[*Antitrichia*][*Helodium*]**Prorulose***Leptohymerium**Pirella**Pterigynandrum**Lescuraea*<sup>†</sup>[*Bryhnia*][*Hylocomium*][*Pterogonium*][*Ctenidium*][*Isothecium*][*Rhytidiadelphus*][*Dendroalsia*][*Porotrichum*][*Rhytidium*][*Helodium*]

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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**Bestia**Brachythecium*<sup>†</sup>*Dichelyma**[Brachelyma]**[Calliergon]**[Campylium]**[Climacium]**[Conardia]**[Cratoneuron]**[Daltonia]**[Drepanocladus]**Eurhynchium**Fabronia**Hygroamblystegium*<sup>†</sup>*Leptodictyum*<sup>†</sup>*Myuroclada**[Forsstroemia]**[Hamatocaulis]**[Homalia]**[Hygrohypnum]**[Jaegerina]**[Limprichtia]**[Metaneckera]**[Palamocladium]**Pirella**Pseudocryphaea**Sarmenthypnum**Scleropodium**Trachybryum**[Palustriella]**[Porotrichum]**[Pseudoleskeella]**[Sanionia]**[Tomentypnum]**[Warnstorfia]**[Wijkia]**[Zelometeorium]*


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

## Group P27

## Papillose

*Anomodon*  
*Braunia*  
*Haplohymenium*

[*Abietinella*]  
 [*Hedwigia*]  
 [*Bryohaplocladium*]  
 [*Callicostella*]  
 [*Claopodium*]

*Heterocladium*<sup>†</sup>  
*Leskea*  
*Lindbergia*<sup>†</sup>

[*Cyclodictyon*]  
 [*Cyrto-hypnum*]  
 [*Leptopterigynandrum*]  
 [*Pseudobraunia*]

*Racomitrium*  
*Stereophyllum*<sup>†</sup>

[*Pseudoleskea*]  
 [*Raiiella*]  
 [*Thelia*]  
 [*Thuidium*]

## Prorulose

*Heterocladium*<sup>†</sup>  
 [*Dendroalsia*]

*Schwetschkeopsis*  
 [*Porotrichum*]

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

## Group P28

## Costa single, long &amp; narrow.

*Amblystegium*<sup>†</sup>  
*Clasmatodon*  
*Cryphaea*<sup>†</sup>  
*Herpetineuron*

[*Forsstroemia*]  
 [*Groutiella*]  
 [*Heterocladium*<sup>†</sup>]  
 [*Hypopterygium*]  
 [*Isothecium*]

*Hygroamblystegium*<sup>†</sup>  
*Leptodon*  
*Leskeella*  
*Lindbergia*<sup>†</sup>

[*Macrocoma*]  
 [*Macromitrium*]  
 [*Myurella*]  
 [*Neckeropsis*]  
 [*Platylomella*]

*Myrinia*  
*Plagiobryum*  
*Racomitrium*  
*Stereophyllum*

[*Porotrichum*]  
 [*Pseudoleskeella*]  
 [*Racopilum*]  
 [*Schlotheimia*]  
 [*Thamnobryum*]

## Costa short &amp; double, or none.

*Iwatsukiella*  
 [*Donnellia*]  
 [*Drummondia*]  
 [*Forsstroemia*]  
 [*Heterocladium*<sup>†</sup>]

*Stereophyllum*  
 [*Homaliadelphus*]  
 [*Hookeria*]  
 [*Lepidopilum*]  
 [*Leucodon*]

*Vesicularia*  
 [*Neckeropsis*]  
 [*Platydictya*]  
 [*Pseudoleskeella*]  
 [*Sematophyllum*]

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.

\*: Cells indistinctly papillose, i.e., low papillae, or prorulose.

End.