ARTIFICIAL KEY TO FAMILIES

1. Plants with two cotyledons; venation generally reticulate ..........Class I

   DICOTYLDONAE

2. Petals free; flowers dichlamydeous ......................................... Sub-class I

   Polypetalae 1, 2

3. Calyx of distinct sepals, ovary generally superior,
   rarely immersed in the disk or half adnate :

4. Torus small or elongated, not expanded ......................... Group I

   Thalamiflorae

4. Torus thickened or expanded into a fleshy disk ............ Group II

   Disciflorae

3. Calyx of united sepals, ovary usually included in
   calyx tube or inferior .......................................................... Group III

   Calyciflorae

2. Petals united ................................................................. Sub-class II

   Gamopetalae

2. Perianth generally calycine, single or absent ............... Sub-class III

   Monochlamydeae 3

1. Plants with a single cotyledon; venation generally
   parallel (rarely reticulate; e.g. Dioscorea,

   Amorphophallus) ................................................................. Class II

   MONOCOTYLDONAE

---------------------------------------------------------------------

1. Petals absent in some genera of Combretaceae, Sterculiaceae, Flacourtiaceae,
   Molluginaceae, Aizoaceae,

2. Petals united in some genera of the families e.g. Cericaceae, Cucurbitaceae,
   Mimosaceae, Umbeliferae.

3. Sepals and petals distinct in some Euphorbiaceae.
Class I : DICOTYLEDONAE  
Sub-Class I : Polypetalae  

Group I Thalamiflorae :  
1. Stamens numerous (15 or more) :  
   2. Carpels distinct or solitary :  
      3. Terrestrial plants; carpels not sunk in the enlarged torus :  
         4. Leaves sheathing at base ................................................................. Dilleniaceae  
         4. Leaves not sheathing at base ............................................................... Annonaceae  
   2. Carpels syncarpous; ovary unilocular or multilocular :  
      5. Placentation perialta :  
      6. Herbs; ovary sessile :  
         7. Sepals 2-3, caducous; plants usually with yellow juice; fruit ........................................... Papaveraceae  
         mostly a porous dehiscent capsule ...............................................................  
         7. Sepals 4-5, deciduous; plants foetid or not; fruits velvular,  
            dehiscent capsule ............................................................... Capparaceae P.P.  
   6. Trees or shrubs, sometimes rambling, straggling or climbing :  
      8. Ovary raised on a gynophore ................................................................. Capparaceae P.P.  
      8. Ovary sessile :  
         9. Petals absent; plants with yellow juice ..................................................... Piacourtisiaceae  
         9. Petals present; trees with yellow juice .................................................... Cochlospermacese
5. Placentation usually axile:

10. Anthers 1-celled:

11. Herbs or shrubs, rarely trees; leaves simple, entire or
   variously lobed; pollen grains muricate
   ..................................................
   Malvaceae

11. Trees; leaves digitately compound; pollen grain smooth
   ...........................................
   Bombacaceae

10. Anthers two celled:

12. Stamens monadelphous, sometimes ovary raised on a gynophore
   ............................................
   Sterculiaceae

12. Stamens distinct; ovary not as above
   ............................................
   Tiliaceae

1. Stamens limited upto 10:

13. Plants usually twining; carpels free; seeds usually reniform or
   horse-shoe shaped
   ..............................................
   Mahiispermacese

13. Plants erect; herbs, shrubs or trees; carpels united; seeds not as
    above:

14. Leaves scale like; seeds comose
    .............................................
    Tamaricaceae

14. Leaves well developed; seeds not as above:

15. Flowers syhomorphic:

16. Posterior petal at least minutely spurred; one of anther cells
    also spurred; placentation peristal; stamens free
    ...........................................
    Violaceae
16. Petals and anthers not spurred; stamens monadelphous above
   the middle; placentation axile ......................... Polygalaceae

15. Flowers actinomorphic:

17. Sepals 2; ovary half adnate ............................. Portulacaceae

17. Sepals 4-5; ovary superior:

18. Petals 4; cruciform; stamens tetradynamous; placentation
   parietal; fruit a silique ............................... Brassicaceae

18. Petals 4-5 but not cruciform; stamens 5 not as above;
   placentation axile or free central:

19. Stipules scarios or hyaline; placentation free central . Caryophyllaceae

19. Stipules not as above; placentation axile ............. Balsaminaceae

Group II DISCIFLORAE

1. Inflorescence leaf-opposed:

2. Plants usually erect ..................................... Leguminosae

2. Plants climbing, usually with leaf-opposed tendrils .............. Vitaceae

1. Inflorescence not leaf-opposed:

3. Herbs:

4. Plants without tendrils:

5. Flowers actinomorphic:

6. Fruits indehiscent of 4–6 cocci; each coccus with two sharp divaricate spines; stamens 5 + 5 .................. Zygophyllaceae
6. Fruits a dehiscent capsule; stamens 5 + 5 .................. Oxalidaceae
5. Flowers zygomorphic ........................................... Balsaminaceae

3. Trees or shrubs:

7. Leaves compound:

8. Leaflets two .................................................. Balanitaceae
8. Leaflets more than two:

9. Plants resinous; fruit trigonous with heart shaped pyrenes .... Bursaraceae
9. Plants not resinous; fruits not as above:

10. Leaflets gland dotted ...................................... Rutaceae
10. Leaflets not gland dotted:

11. Flowers regular; placentation axile or basal:

12. Stamens monoadelophous .................................. Meliaceae
12. Stamens free:

13. Plants with acrid, resinous juice ........................ Anacardiaceae
13. Plants not as above:

14. Ovary lobed; disc not unilateral ........................... Simaroubiaceae
<table>
<thead>
<tr>
<th>Group III</th>
<th>CALCIIFLORA F.</th>
<th>Group IV</th>
<th>CALCIIFLORA F.</th>
<th>Group V</th>
<th>CALCIIFLORA F.</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Carpels monoderriform; fruits a legume.</td>
<td>1.</td>
<td>Carpels more than one; fruit not a legume.</td>
<td>1.</td>
<td>Plants usually tendril.</td>
</tr>
<tr>
<td>2.</td>
<td>Flowers zygomorphic or sub-zygomorphic.</td>
<td>2.</td>
<td>Flowers actinomorphic.</td>
<td>2.</td>
<td>Plants unarmed.</td>
</tr>
<tr>
<td>4.</td>
<td>Carpels free; fruit not an achene.</td>
<td>4.</td>
<td>Carpels united; fruit not an achene.</td>
<td>4.</td>
<td>Plants unarmed.</td>
</tr>
<tr>
<td>5.</td>
<td>Leaves simple.</td>
<td>5.</td>
<td>Leaves simple.</td>
<td>5.</td>
<td>Leaves simple.</td>
</tr>
<tr>
<td>7.</td>
<td>Flowers sympollinomorphic; placentation pericentral.</td>
<td>7.</td>
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<td>Flowers sympollinomorphic; placentation pericentral.</td>
</tr>
<tr>
<td>8.</td>
<td>Plants armed with straight or hooked spines.</td>
<td>8.</td>
<td>Plants unarmed.</td>
<td>8.</td>
<td>Plants unarmed.</td>
</tr>
<tr>
<td>9.</td>
<td>Shrubs or woody twiners or climbers.</td>
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<td>11.</td>
<td>Flowers zygomorphic; placentation pericentral.</td>
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<td>12.</td>
<td>Carpels more than one; fruit not a legume.</td>
<td>12.</td>
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<td>Carpels more than one; fruit not a legume.</td>
</tr>
<tr>
<td>15.</td>
<td>Flowers zygomorphic; placentation pericentral.</td>
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<td>20.</td>
<td>Flowers zygomorphic; placentation pericentral.</td>
<td>20.</td>
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<td>20.</td>
<td>Flowers zygomorphic; placentation pericentral.</td>
</tr>
<tr>
<td>22.</td>
<td>Flowers zygomorphic; placentation pericentral.</td>
<td>22.</td>
<td>Flowers zygomorphic; placentation pericentral.</td>
<td>22.</td>
<td>Flowers zygomorphic; placentation pericentral.</td>
</tr>
<tr>
<td>27.</td>
<td>Leaves simple.</td>
<td>27.</td>
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<td>27.</td>
<td>Leaves simple.</td>
</tr>
<tr>
<td>28.</td>
<td>Flowers zygomorphic; placentation pericentral.</td>
<td>28.</td>
<td>Flowers zygomorphic; placentation pericentral.</td>
<td>28.</td>
<td>Flowers zygomorphic; placentation pericentral.</td>
</tr>
<tr>
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</tr>
<tr>
<td>30.</td>
<td>Flowers zygomorphic; placentation pericentral.</td>
<td>30.</td>
<td>Flowers zygomorphic; placentation pericentral.</td>
<td>30.</td>
<td>Flowers zygomorphic; placentation pericentral.</td>
</tr>
<tr>
<td>32.</td>
<td>Flowers zygomorphic; placentation pericentral.</td>
<td>32.</td>
<td>Flowers zygomorphic; placentation pericentral.</td>
<td>32.</td>
<td>Flowers zygomorphic; placentation pericentral.</td>
</tr>
</tbody>
</table>
5. Plants usually erect herbs, shrubs, undershrubs or trees; rarely
twining in Combretaceae, but with tendrils:

6. Petals absent:

7. Herbs:

8. Stamens hypogynous; ovary 3-5-celled ........................................ Molluginaceae
8. Stamens perigynous; ovary 1-2-celled ........................................ Aizoaceae
7. Trees ............................................................... Combretaceae

6. Petals present:

9. Ovary superior:

10. Soft-wooded trees ......................................................... Caricaceae
10. Herbs, shrubs, but not soft wooded ........................................ Lythraceae

9. Ovary inferior:

11. Flowers unisexual; sepals and petals 2; fruit winged .............. Begoniaceae
11. Flowers bisexual; sepals, petals and fruits not as above except

Combretaceae:

12. Trees:

13. Leaves opposite, with intramarginal nerves .......................... Myrtaceae
13. Leaves alternate; leaves without intramarginal nerves ........... Aizoaceae

12. Herbs;
14. Inflorescence usually umbellate, fruit schizocarpic ........ Apiaceae

14. Inflorescence not umbellate; fruit a capsule:

15. Capsule 2-celled, subglobose or ovoid; leaves usually opposite; flowers axillary, geminate ................. Vahliaeeae

15. Capsule 4-5-celled, linear, leaves mostly alternate, if opposite, flowers axillary, solitary ....................... Onagraceae

12. Woody climber; ovary one-celled; fruit samara ................. Combretaceae
Sub-Class II : Camptesiae

1. Ovary inferior :
   2. Leaves opposite, usually stipulate ................................................................. Rubiaceae
   2. Leaves mostly alternate, estipulate :
      3. Inflorescence an involucrate head ................................................................. Asteraceae (Compositae)
      3. Inflorescence not as above :
         4. Placentation axile :
            5. Corolla sygomorphous; anthers united into a tube ............................... Lobeliaceae
            5. Corolla nearly regular; anthers free .................................................... Campanulaceae
            4. Placentation parietal ................................................................................. Gesneriaceae

1. Ovary superior :
   6. Parasitic plants :
      7. Placentation axile .......................................................................................... Scrophulariaceae
      7. Placentation parietal ...................................................................................... Orobanchaceae
   6. Aquatic herbs, with leaf bladders ................................................................... Lentibulariaceae
   6. Terrestrial plants but not parasitic :
      8. Corolla regular :
         9. Leaves opposite :
10. Plants usually with milky latex or greenish yellow watery sap:

11. Pollen grains agglutinated into wax-like masses or pollinia; styles two:

12. Filaments united; anthers with hoary wings

13. Filaments free; anthers without hoary wings

11. Pollen masses not as above; anthers sagittate; stigma hour-glass shaped or dumbell shaped; style one

Asclepiadaceae

Periplocaee

Apocynaceae

10. Plants without milky latex or greenish-yellow sap; if latex present, anthers, stigma etc., not as above and pollinia absent:

13. Inflorescence usually secund or one sided cyme:

14. Leaves opposite

Loganiaceae

14. Leaves alternate:

15. Herbs erect, diffuse or prostrate; style 1; fruits of nutlets or a capsule:

16. Glandular-pubescent herbs; fruit a capsule

Hydrophyllaceae

16. Herbs, not as above; fruit of nutlets

Boraginaceae

15. Trees or shrubs; style once forked or style 2 distinct;

fruit drupe

Rhetsiaceae

13. Inflorescence not as above:
<table>
<thead>
<tr>
<th>17. Leaves opposite:</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>18. Stamens 2:</td>
<td>Oleaceae</td>
</tr>
<tr>
<td>18. Stamens 4-5:</td>
<td>Salviadoracae</td>
</tr>
<tr>
<td>19. Trees or shrubs; fruit a berry:</td>
<td></td>
</tr>
<tr>
<td>19. Herbs; fruit a capsule:</td>
<td>Gentianaceae</td>
</tr>
<tr>
<td>20. Placentation free central:</td>
<td>Primulaceae</td>
</tr>
<tr>
<td>20. Placentation parietal:</td>
<td></td>
</tr>
<tr>
<td>17. Leaves alternate:</td>
<td></td>
</tr>
<tr>
<td>21. Flowers usually unisexual; stamens inserted on the receptacle:</td>
<td>Hbenaceae</td>
</tr>
<tr>
<td>21. Flowers bisexual; stamens inserted on the corolla:</td>
<td></td>
</tr>
<tr>
<td>22. Trees; plants with milky juice, corolla 4-8 lobed:</td>
<td>Sapotaceae</td>
</tr>
<tr>
<td>22. Herbs, undershrubs, or twining; corolla usually 5 lobed:</td>
<td></td>
</tr>
<tr>
<td>23. Carpels 2; ovary 2, rarely 4-celled; ovules few to many on axile placentation:</td>
<td></td>
</tr>
<tr>
<td>24. Erect herbs or undershrubs; ovaries 2-celled or rarely 4-celled; ovules many in each cell:</td>
<td>Solanaceae</td>
</tr>
<tr>
<td>24. Mostly climbing, sometimes diffuse or prostrate herbs; ovaries 2-celled; ovules few in each cell:</td>
<td>Convolvulaceae</td>
</tr>
</tbody>
</table>
23. Carpels 5; styles 5, free; ovary one-celled; ovule one
on basal placentation ................................................................. Pitymbeginae

8. Corolla irregular; sometimes actinomorphic in some Scrophulariaceae;
ove 2-4 celled:

24. Leaves compound ........................................................................ Bignoniaceae P.P.

24. Leaves simple:

25. Flowers with conspicuous bracts and bracteoles, bracts seldom
absent ................................................................................................. Acanthaceae

25. Flowers with or without bracts:

26. Inflorescence a verticillaster, style gynobasic .............................. Lamiaceae

26. Inflorescence not as above, style terminal:

27. Placentation parietal; fruit hard, woody, black with two
prominent curved hooks .................................................................. Martyniaceae

27. Placentation axile; fruit an unarmed capsule or drupe:

28. Ovules many in each cell; fruit a capsule:

29. Flowers with distinct glands at the base of pedicel.............. Pedaliaceae

29. Flowers without extra-floral glands ......................................... Scrophulariaceae

28. Ovules 1 to 2 in each cell .......................................................... Verbenaceae
Sub-Class III Monochlamydae

1. Ovary superior:
   2. Leaves with ochraceous stipules ............................................ Polygonaceae
   2. Leaves estipulate or with a thin stipular line:
   3. Ovary tricarpellary; style 3-6 distinct ....................................... Ruphorbiaceae
   3. Ovary 1 to 2 carpellary:
   4. Perianth petaloid, contracted at base, enveloping the ovary .......... Nyctaginaceae
   4. Perianth not petaloid, if petaloid not as above:
   5. Plants with milky latex or watery juice ......................................
   6. Herbs .............................................................................. Urticaceae
   6. Trees or shrubs:
   7. Plants with milky juice; inflorescence a hypanthodium ................. Moraceae
   7. Plants with watery juice; inflorescence a panicle or in axillary fascicles ........................................ Ulmaceae
   5. Plants without milky latex or watery juice:
   8. Bracts and bracteoles scarious .................................................. Amaranthaceae
   8. Bracts and bracteoles absent; if present herbaceous ..................... Chenopodiaceae

1. Ovary inferior:
   9. Root parasite ........................................................................... Santalaceae
   9. Stem parasite ........................................................................... Loranthaceae
Class II MONOCOTYLEDONAE

1. Perianth present :

2. Ovary inferior :

3. Inflorescence usually umbellate .................................................. Amaryllidaceae

3. Inflorescence racemose or paniculate, sometimes flowers solitary :

4. Flowers actinomorphic :

5. Plants climbing ................................................................. Dioscoreaceae

5. Plants not climbing :

6. Plants aquatic ................................................................. Hydrocharitaceae

6. Plants terrestrial :

7. Arborescent; leaves all radical, fibrous; inflorescence paniculate on a woody scape ........................................... Agavaceae

7. Herbaceous; inflorescence not as above :

8. Leaves plicate; ovary one-celled, with three celled with exile placentation ........................................... Hypoxidaceae

8. Leaves not plicate; ovary one celled, with three parietal placentas ........................................... Taccaceae

4. Flowers zygomorphic :

9. Corolla spurred; ovary spirally twisted, gynostegium present; anthers with pollinia ........................................... Orchidaceae
9. Corolla and ovary not as above, gynostegium and pollinia absent... *Zingiberaceae*

2. Ovary superior:

10. Aquatic plants:

11. Carpels 3, syncarpous, ovary tricarpellary .......................... *Pontederiaceae*

11. Carpels one or more, apocarpous:

12. Perianth composed of calyx and corolla; perianth of 6 parts in two series ................................................................. *Alismaceae*

12. Perianth calyx-like, of one whorl ................................. *Potamogetonaceae*

12. Perianth two lipped; of scales .................................................. *Najadaceae*

10. Terrestrial plants:

13. *Trees with annulate trunk or trunks covered with persistent leaf bases, leaves always in terminal crown* .................. *Arecaceae* (Palmaceae)

13. *Herbs or herbaceous climber* :

14. Flowers in terminal, solitary, compact head .................. *Bromeliaceae*

14. Flowers not in head:

15. Flowers bracteate ................................................................. *Commelinaceae*

15. Flowers ebracteate ................................................................. *Liliaceae*
1. Perianth none, at least in male flowers (if the flowers unisexual)
   or rudimentary or represented by bristles or scales:

3. Inflorescence various of terminal spikelets:

16. Culms trigonous solid; leaves tristichous, eli-agulate; spikelets bisexual; fruit nut .............................................. Cyperaceae

16. Culms mostly below, cylindrical or flattened, leaves ligulate; spikelets uni-or bi-sexual; fruit caryopsis ..................... (Gramineae)

3. Inflorescence not made up of spikelets:

17. Flowers enclosed in the spathe; stamens 1-3; connective produced beyond the anthers; ovary stipitate ......................... Typhaceae

17. Flowers enclosed in a spathe; stamen 1; connective not produced; ovary sessile ........................................... Araceae
PLATE 1: Map of Chhetraudepur forest division:

(1) Naswadi range
(2) Jambughoda range
(3) Pavijetpur range
(4) Chhotaudepur range
(5) Kawant range
PLATE 2: 1. A view of hilly region at Kadipani.
2. Another bridge on river Orsang near Chhotaudepur on way to Kawant. Note alluvial river bed in this part.
3. The photograph shows the insect larvae which feed on herbaceous vegetation.
4. The forest view at Vaghasthal. Note the stony plain ground in front.
5. Close up of Urgenia indica Kunth. in the stony ground shown in Photograph 4.
PLATE 3:  

2. *Talosma pallida* (Roxb.) Craib.  
3. *Oxystelma secamone* (Linn.) Karst.  
4. *Tacea leontopetaloides* (Linn.)  
   0. Muntez
PLATE 4: 1. *Capparis grandis* Linn. f. at Chhotaudepur

2. A view of the forest tree covered by climbers and twiners.

   Inflorescence

   Note the height of the grass.
PLATE 5
1. Holarrhena antidysenterica (Heyne ex Roth) A. Do.
2. Celastrus paniculata Wild.