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Compositae of Ecuador, I: Key to frequently collected genera

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Abstract

A key is provided for 57 of the 152 genera of the Compositae that are known to occur in Ecuador. These genera include those that are most commonly collected in Ecuador and those that have the most species. It is believed that most of the specimens of Compositae collected in Ecuador will fall into one of these genera.

Resumen

Una clave está provista de 57 de los 152 géneros de Compositae conocidos en Ecuador. Estos géneros incluyen a aquellos que son comúnmente colectados en Ecuador y los que tienen mayor número de especies. La mayoría de los especímenes de Compositae colectados en Ecuador se encuentran dentro de estos géneros

Introduction

The Compositae of Ecuador are a rich and diverse group with 152 genera and 753 species based on collections above 1000 m at the U.S. National Herbarium, Smithsonian Institution (see Funk, this volume, Appendix A, for a complete listing of all 180 genera known to occur in Ecuador). The family is best represented in the Andes and the eastern slope forests. Another paper in this volume gives some information on the distribution of the family and a discussion about its relationships (Funk, this volume). The genera with the most species (22 genera have more than 10 species) plus those containing the most commonly collected species (an additional 35 genera) total 57. Below we provide a key to the tribes of Ecuadorean Compositae followed by a key to the genera of each tribe that fall within the group of 57 genera under discussion. Although this key covers only 57 (37%) of the at least 152 genera found in Ecuador, based on incoming gifts for determination that we receive, we think it should cover approximately 75% of the specimens collected.



Figure 1. Senecioneae. a. *Pentacalia ilicifolia* (L. fil.) Cuatrecasas & H. Robinson (from Nordenstam 1978). b. *Gynoxys buxifolia* (HBK) Cassini. c. *Senecio* (*Culcitium*) *nivalis* (HBK) Cuatrecasas (b, c from Humboldt et al. 1820).



Figure 2. Astereae. a-b. *Baccharis pedunculata* (Miller) Cabrera and *B. trinervis* Pers. (from D'Arcy 1975). c. *Diplostephium rupestre* (HBK) Weddell (from Cuatrecasas 1969).



Figure 3. Eupatoriaceae. a. *Mikania micrantha* HBK. (from Holmes & McDaniel 1982) b. *Ageratina prunifolia* (HBK) R. M. King & H. Robinson (from Humboldt et al. 1820)



Figure 4. Heliantheae and Vernoniaeae a. *Clibadium surinamense* L.
b. *Cyrtocymura scorpioides* (Lam.) H. Robinson. Illustrations by A. Tangerini.

Illustrations of several genera in the tribes Senecioneae (*Gynoxys*, *Senecio*, and *Pentacalia*), Astereae (*Diplostephium* and *Baccharis*), Eupatorieae (*Ageratina* and *Mikania*), Heliantheae (*Clibadium*) and Vernonieae (*Cyrtocymura*) are included (Figures 1-4). The genera of the Gnaphalicae and Plucheeae such as *Loricaria*, *Gnaphalium*, and *Tessaria* are illustrated in the Flora of Peru (Dillon & Sagástegui-Alva 1991). Illustrations of most genera of the Liabeae, including *Munnozia* and *Erato*, and illustrations or photographs of genera of the Mutisieae and Barnadasieae (such as *Mutisia* and *Chuquiraga* respectively) are already published in the Flora of Ecuador series (Robinson 1978, Harling 1991).

Key to tribes of the Compositae

1. Shrubs or trees, spinose or densely foliate with sharp tipped leaves; pappus plumose Barnadasieae
1. Herbs or shrubs without spines on stems and leaf tips; pappus not plumose (except *Tridax*)
 2. Corollas all ligulate or bilabiate or at least outer florets bilabiate
 3. Corollas all ligulate; anthers sagittate at the base; sap milky Chichorieae
 3. Corollas bilabiate; anthers caudate at base; no milky sap Mutisieae
 2. Corollas of at least the central florets with regular 4-5-merous corollas, never ligulate or bilabiate
 4. Leaves opposite, at least the lower ones
 5. Style branch apex club-shaped with long apical appendage, as long as lower stigmatic part of branch, often the same color as the corolla; ray florets absent; disk florets usually purple, sometimes white, pink and blue Eupatorieae
 5. Style branch apex acute or flattened with short or no apical appendage, usually yellow or dark colored; ray florets usually present and usually yellow or white, rarely other colors, disk usually yellow.
 6. Phyllaries appearing uniseriate Senecioneae (*Gynoxys*)
 6. Phyllaries in 2 or more series
 7. Receptacle usually paleaceous; phyllaries usually biseriate; never with milky sap Heliantheae
 7. Receptacle usually naked; phyllaries usually imbricate in several rows; often with milky sap Liabeae
 4. Leaves alternate
 8. Pappus absent; bracts of the involucre scarious only on margins; plants often aromatic Anthemideae
 8. Setose pappus usually present; bracts of the involucre herbaceous; plants usually not aromatic
 9. Involucral bracts all equal and in one row Senecioneae
 9. Involucral bracts imbricate in several rows.
 10. Anther bases tailed; marginal florets filiform; leaves often with woolly hairs
 11. Involucral bracts scarious Gnaphalicae
 11. Involucral bracts not scarious Plucheeae (*Tessaria*)
 10. Anther bases sagittate; all disk florets tubular; leaves sometimes pubescent but rarely densely woolly
 12. Ray florets absent, disk florets often blue or purple but never yellow;

- sweeping hairs of style borne on branches and upper shaft; stigmatic surface covering whole inner surface of branch **Vernonieae**
12. Ray florets usually present, if absent then disk florets yellow; sweeping hairs of style short, borne only on branches; stigmatic surface in two separate marginal lines on style branches **Astereae**

Key to Genera within each Tribe

(Tribes in alphabetical order; no genera in the tribe Anthemideae fall within the 57 genera under discussion)

ASTEREAE

1. Plants dioecious *Baccharis*
1. Plants with bisexual heads.
2. Shrubs and trees with coriaceous or subcoriaceous leaves *Diplostegium*
2. Herbs or subshrubs with chartaceous, membranaceous or soft leaves.
3. Disk florets functionally male, with non-stigmatic style branches *Oritrophium*
3. Disk florets bisexual, with style branches bearing stigmatic lines.
4. Ray florets with obvious, elongate limbs *Erigeron*
4. Ray florets w/limbs obscure or lacking *Conyza*

BARNADESIEAE

1. Heads with bisexual florets of two types, outer series strongly ray-formed; anthers caudate; pollen lophate *Barnadesia*
1. Heads with bisexual florets of one type, discoid; anthers caudate at base; pollen oblate, psilate *Chuquiraga*

CHICHORIEAE

1. Achenes not rostrate above; pappus scabrid *Hieracium*
1. Achenes with short or long rostrum above; pappus plumose *Hypochaeris*

EUPATORIEAE

1. Pappus of 3-6 glanduliferous viscid knobs *Adenostemma*
1. Pappus of setae, scales, or lacking.
2. Pappus of broadly based awns, scales, or lacking.
3. Heads with 5 involucre bracts and 5 florets; corollas with numerous hairs inside ... *Stevia*
3. Heads with more than 5 involucre bracts or florets; corollas without hairs inside *Ageratum*
2. Pappus of numerous capillary bristles.
4. Style appendages broadened, more than twice as wide as thick.
5. Achenes without glands, with non-glandular setulae; involucre bracts rather persistent *Aristeguietia*
5. Achenes with numerous glands, without setulae; inner involucre bracts often deciduous *Badilloa*
4. Style appendages not enlarged or distinctly clavate, less than twice as wide as thick.
6. Involucre bracts all deciduous, leaving bare receptacle, remaining appressed until lost, not spreading with age *Chromolaena*
6. Involucre with at least lower bracts persistent, spreading with age, receptacle not completely bare when old
7. Heads with 4 florets and 4 involucre bracts, often with a prominent fifth subin-

- volucral bract; plants usually scandent *Mikania*
7. Heads with more than 4 florets or 4 involucral bracts; plants not scandent.
8. Corollas and achenes with only glandular dots, without setulae; bases of styles pubescent *Austroeupatorium*
8. Corollas and achenes with or without glandular dots, usually with non-glandular setae; bases of styles glabrous.
9. Carpodia of achenes without distinct projecting upper rim; involucral bracts eximbricate or weakly subimbricate; inner surfaces of corolla lobes densely papillose. *Ageratina*
9. Carpodia of achenes with distinctly projecting upper rim; involucral bracts usually distinctly subimbricate, with 3 or more series of graduated bracts; inner surfaces of corolla lobes with elongate cells, not papillose or projecting only at ends of cells.
10. Corolla with veins thickened in lower part of throat; cells of lobes with projecting upper ends; style base not enlarged above nectary *Fleischmannia*
10. Corolla with veins not thickened; lobes smooth without projecting upper ends of cells; style base with enlarged node above nectary.
11. Florets 20-80; bracts of the involucre 15-30; receptacle glabrous; achene with carpodium asymmetrical *Heterocondylus*
11. Florets 200-300; bracts of the involucre 40-50; receptacle shortly puberulous; achene with symmetrical carpodium *Polyanthina*

HELIANTHEAE

1. Pappus with retrorsely barbed awns; disk achenes obcompressed *Bidens*
1. Pappus absent or without retrorse barbs; disk achenes not obcompressed.
2. Pappus bristles plumose *Tridax*
2. Pappus without plumose bristles.
3. Heads with disk florets functionally male.
4. Involucre without outer foliose involucral bracts, with inner bracts not completely enclosing fertile achenes *Clibadium*
4. Involucre with well-developed spreading outer bracts, with inner bracts completely enclosing fertile achenes *Smallanthus*
3. Heads with bisexual disk florets.
5. Achenes compressed.
6. Ray florets sterile, without styles; achenes without wings or distinctive marginal setae *Pappobolus*
6. Ray florets usually present, fertile, with styles; achenes usually with wings or with fringe of distinctive setae on margins
7. Receptacle becoming strongly conical or columnar with age; achenes with cartilaginous wings narrow or lacking *Acmella*
7. Receptacle convex, not elongating with age; achenes usually with broad cartilaginous wings *Verbesina*
5. Achenes terete or prismatic.
8. Achenes with fleshy surface, 4-5 mm long, blackened layer without pale longitudinal lines *Wulffia*
8. Achenes without fleshy surface, 2 mm long or less, blackened layer with pale longitudinal lines.
9. Inflorescence with peduncles not elongating after onset of anthesis; ray florets tubular, with little or no limb; pappus usually present on some achenes; herb to 1 m, not found over 2000 m in elevation *Galinsoga*

9. Inflorescence with peduncles elongating after onset of anthesis; ray florets with short but obvious, often trilobate limb; pappus lacking; small plant found over 3000 m in elevation *Aphanactis*

GNAPHALIEAE

1. Leaves scale-like, distichous; plants dioecious *Loricaria*
 1. Leaves not distichous; plants bisexual.
 2. Pappus bristles fused at base and falling as unit.
 3. Heads mostly or completely sessile or subsessile, with 10 or more pistillate florets *Gamochoaeta*
 3. Heads always pedunculate, usually with 4 pistillate florets *Jalcophiola*
 2. Pappus bristles free at base, falling separately.
 4. Heads narrow, with 3-6 female florets and 1-3 bisexual florets *Achyrocline*
 4. Heads broadly campanulate, with numerous female and bisexual florets *Gnaphalium*

LIABEAE

1. Leaves not tomentose, hairs of leaves and stems stiff, with enlarged bases.
 2. Small, mostly decumbent herbs; leaf blades trinervate at base; achenes compressed, with 2 ribs; pappus reduced or lacking *Philoglossa*
 2. Robust erect herbs or subshrubs; leaf blades with 5-9 radiating veins; achenes mostly 4-angled; pappus of many awns or bristles *Erato*
 1. Leaves usually tomentose, at least on undersurface; hairs not stiff and lacking enlarged bases.
 3. Plants without latex; anthers pale; inflorescence densely branched, lower branches subumbellate *Liabum*
 3. Plants usually with latex; anthers usually black; inflorescence laxly branched with long peduncles *Munnozia*

MUTISIEAE

1. Style tips rounded to shortly acuminate, papillate; leaves with apical tendril *Mutisia*
 1. Style tips truncate with crown of sweeping hairs; leaves without apical tendril.
 2. Tall perennial herbs, scandent or viny subshrubs, or lianas; leaf blades palmate, abruptly petiolate, not rosulate or decrescent; receptacle paleaceous; corollas usually white, occasionally pink or lilac; anthers pale *Jungia*
 2. Small to medium-sized perennial herbs or rarely subshrubs, never scandent, viny, or climbing; leaf blades not palmate, not abruptly petiolate, rosulate at base, decrescent above; receptacle epaleaceous; corollas usually blue or violet, sometimes white, pink, or purple with anthers purplish-black *Perezia*

PLUCHEAE

- Trees or less commonly shrubs; capitula with only one hermaphroditic floret *Tessaria*

SENECIONEAE

1. Florets orange-red *Pseudogynoxys*
 1. Florets yellow, white, violet-purple or pink, but not orange-red.
 2. Perennials; leaves in a basal rosette or mat-forming with leaves along rhizomes; growing at ca. 3000 m and above.
 3. Leaves densely pubescent on both surfaces; heads with a calyculus *Culcitium*
 3. Leaves with a few scattered hairs or glabrous; heads without a true calyculus
 4. Plants forming thick mats or hummocks; leaves along rhizome for several centimeters.
 *Xenophyllum*

4. Plants solitary or in very open mats; leaves grouped at apex of rhizome *Werneria*
 2 Shrubs, subshrubs, annuals and a few perennials; leaves spread along stems; growing at a variety of elevations (0 - over 3000 m).
 5. Leaves opposite. *Gynoxys*
 5. Leaves alternate.
 6. Woody lianas, sometimes epiphytic; leaf margins mostly entire; achenes 5 ribbed; receptacle not fistulose *Pentacalia*
 6. Annuals, perennials, subshrubs, and shrubs; leaf margins lobed or toothed to entire; achenes 10 ribbed; receptacle usually fistulose.
 7. Subshrub; heads solitary or few, discoid; florets yellow; style with penicillate apical appendage; leaves sessile to short petiolate; achenes oblong *Lasiocephalus*
 7. Annuals, perennials, subshrubs, shrubs and trees; heads various, radiate or discoid; florets usually yellow, sometimes pink, purple, violet or white; style without penicillate apical appendage; leaves various; achenes ellipsoid-oblong-ovoid *Senecio*

VERNONIEAE

1. Involucre with deciduous inner bracts; corolla lobes often strongly recurved.
 2. Plants often scandent; anthers with sclerified tails *Piptocarpha*
 2. Shrubs or trees; anthers with tails or spurs not sclerified *Critoniopsis*
 1. Involucre with persistent bracts; corolla lobes not or rarely strongly recurved.
 3. Inflorescence usually with multiply branched cymes, without foliose bracts; achene wall with quadrate raphids; pollen echinate *Vernonanthura*
 3. Inflorescence usually seriatly or scorpioid cymose, with or without leaves or foliose bracts near heads; achene wall with elongate raphids.
 4. Inflorescence branches with scorpioid tips, heads dense and borne in contiguous series; pollen echinate *Cyrtocymura*
 4. Inflorescence branches without scorpioid tips, heads usually separated or in separate small groups; pollen lophate *Lepidaplou*

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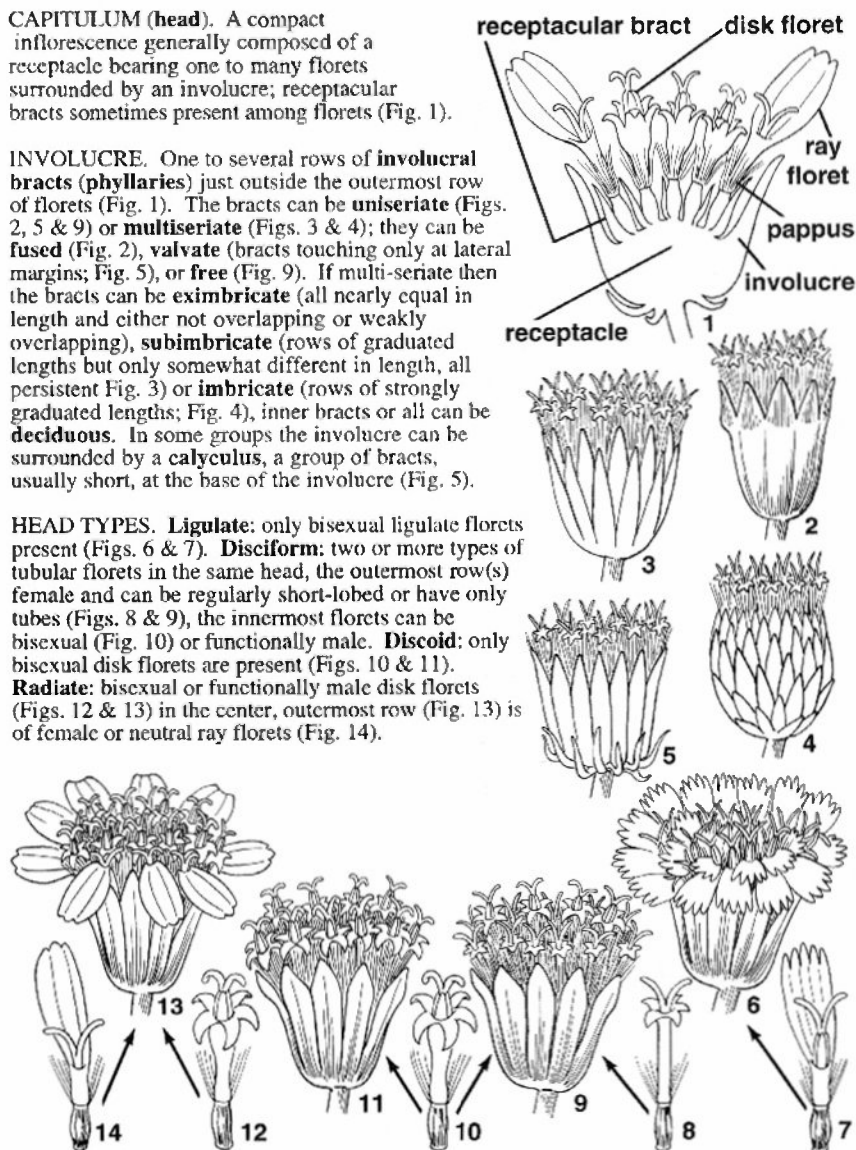
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CAPITULUM (head). A compact inflorescence generally composed of a receptacle bearing one to many florets surrounded by an involucre; receptacular bracts sometimes present among florets (Fig. 1).

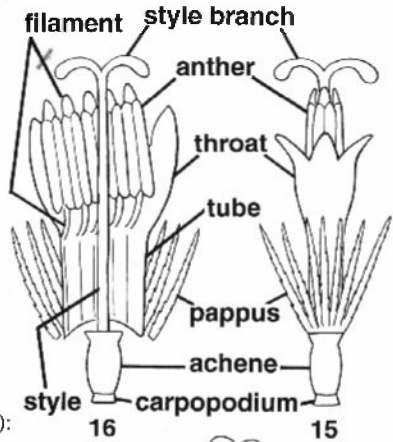
INVOLUCRE. One to several rows of **involucral bracts (phyllaries)** just outside the outermost row of florets (Fig. 1). The bracts can be **uniseriate** (Figs. 2, 5 & 9) or **multiseriate** (Figs. 3 & 4); they can be **fused** (Fig. 2), **valvate** (bracts touching only at lateral margins; Fig. 5), or **free** (Fig. 9). If multi-seriate then the bracts can be **eximbricate** (all nearly equal in length and either not overlapping or weakly overlapping), **subimbricate** (rows of graduated lengths but only somewhat different in length, all persistent Fig. 3) or **imbricate** (rows of strongly graduated lengths; Fig. 4), inner bracts or all can be **deciduous**. In some groups the involucre can be surrounded by a **calyculus**, a group of bracts, usually short, at the base of the involucre (Fig. 5).

HEAD TYPES. Ligulate: only bisexual ligulate florets present (Figs. 6 & 7). **Disciform:** two or more types of tubular florets in the same head, the outermost row(s) female and can be regularly short-lobed or have only tubes (Figs. 8 & 9), the innermost florets can be bisexual (Fig. 10) or functionally male. **Discoid:** only bisexual disk florets are present (Figs. 10 & 11).

Radiate: bisexual or functionally male disk florets (Figs. 12 & 13) in the center, outermost row (Fig. 13) is of female or neutral ray florets (Fig. 14).

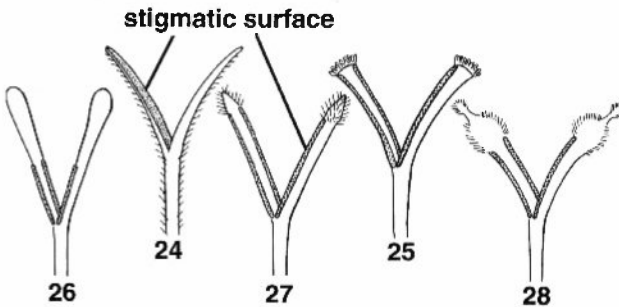
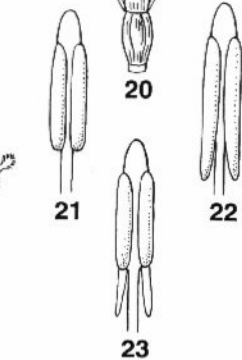
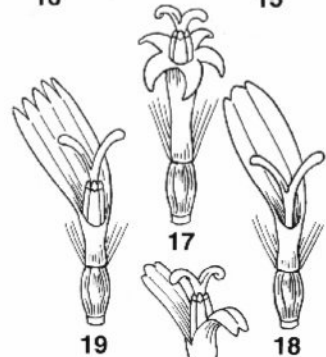


FLORETS. Figures 15 & 16 show details of a disk floret, note the stamens which have **filaments** that are free from one another but adnate to the corolla tube while the **anthers** or **thecae** (pollen sacs) are connate at the margins. The **ovary** is inferior with one locule and one basal ovule, and there is one **style** with two branches. **Disk florets** (Fig. 10, 12, & 15-17): bisexual or functionally male florets with a regular corolla that is divided into the **tube**, **throat**, and **lobes** (Figs. 15 & 16), in some species each disk floret is subtended by a **receptacular bract** (**chaff, pale**; Fig. 1). **Ray florets** (Figs. 1, 13, 14 & 18): female or neutral flowers with an irregular corolla that is divided into a tube and limb. **Ligulate florets** (Fig. 19): bisexual flowers with an irregular corolla that is strap-shaped with 5 lobes all on one side. **Bilabiate florets** (Fig. 20): bisexual flowers with an irregular corolla that has 5 lobes but is more deeply divided into two parts.



ANTHERS. Usually 5 in number and can be **ecaudate** (without basal tails; Fig. 21), **calcarate** (spurred with fertile basal tails; Fig. 22), **caudate** (with sterile basal tails; Fig. 23); they can have **apical appendages** that are either short or long (Figs. 21-23).

STYLE. The apex of the style can be **lanceolate** (Fig. 24) or **truncate** (Fig. 25), both without an apical appendage extending beyond the stigmatic surface, or with apical appendages that are **rounded** and/or **clavate** (Fig. 26), **acute** (Fig. 27), or **acuminate** (Fig. 28); the **stigmatic surface** (stippled; Figs 24-28) is on the **style branches** (Figs. 15-16) and can be either a **continuous surface** (Fig. 24) or in **two lines** (Figs. 25-28).



ACHENES. Achenes can be **pyriform** (pear shaped; Fig. 29), **fusiform** (spindle shaped; Fig. 37), **terete** or **cylindrical** (round in cross-section; Figs. 33, 40, 41 & 43), **prismatic** (angled; Figs. 30 & 34), **obcompressed** (broadest tangential to the head; Figs. 31, 32 & 35), **compressed** (broadest along radius of head; Figs. 36 & 38); some have a distinct basal carpodium (Figs. 15 & 29). The achene surface can be **ribbed** (with ribs on the surface) or smooth and sometimes **pubescent** (with setulae or glands on surface; Fig. 37).

PAPPUS. The pappus is a modified calyx; it can be composed of **bristles** (Figs. 1 & 29), **plumose bristles** (feather-like; Fig. 37), **scales** that are large (Fig. 42) or **coroniform** (Fig. 40), or **awns** that are simple (Fig. 38) or retrorsely barbed (Fig. 31). The pappus can be **deciduous** (Fig. 38) or **absent**.

POLLEN. Grains can be spherical (Figs. 44 & 45) or prolate (Fig. 46); they can be **echinate** (spiny; Fig. 44), **lophate** (surface with areolate pattern; Fig. 45), or **psilate** (smooth; Fig. 46).

