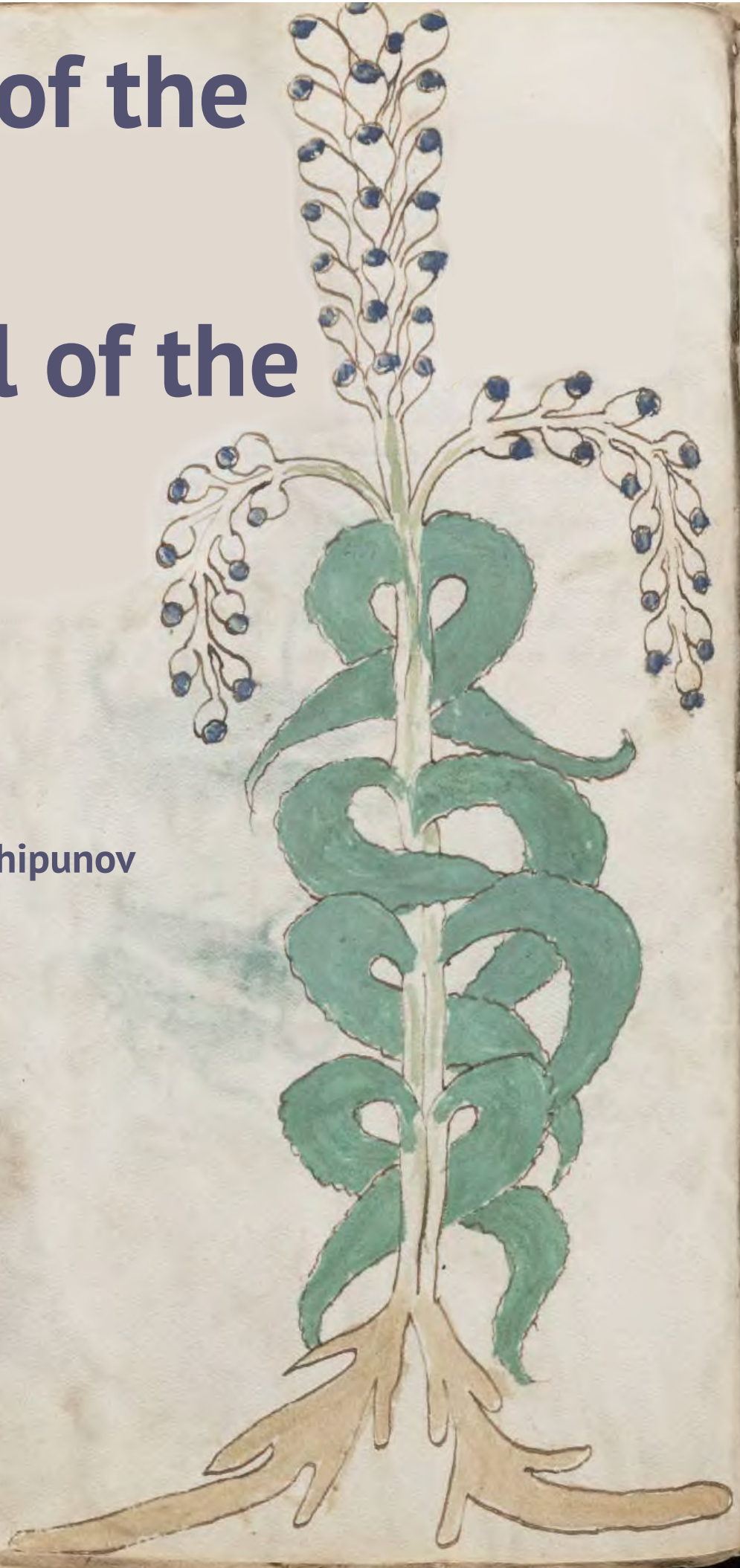
Plants of the World: Manual of the Flora



Alexey Shipunov

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On the cover: One of Voynich book plants.

Chapter 1

Find quickly

Most frequent plant families

It is likely that your plant belongs to one of most frequent plant families. Use the list below to find the name: **compare** your plant with each description. If there is no correspondence, **go** to the next step. As usual in this "Manual", the answer is approximate.

Flower formulas are not absolutely necessary to find the family but they are useful anyway. Familiarize yourself with these formulas using the "Flower formulas" manual; for all botanical terminology, see the "Introduction to Botany" manual (both books are available in "schemes" branch.)

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***Grass-like, graminoids*.** Herbaceous plants, usually perennial with **underground rhizomes**. Stems green, upright, bear **linear leaves** with parallel venation and sheaths (sometimes leaves reduced). Flowers simplified, **not showy**, with bract scales and scaly simple perianth (if any), in various inflorescences. Fruit dry. There are several families in this group, two of them are most widespread:

Grasses. Stem is **hollow**. Leaves flat. Flowers in spikelets, every flower usually has 2 flower scales. Fruit seed-like. $\uparrow P_{2\vee 3}A_{[3-1]\vee 6}G_{(\underline{2})}$ or unisexual . . . . . Family *Gramineae (Poaceae)*.

Sedges. Stem is not hollow. Leaves flat, non-flat or reduced. There is one flower scale; flowers are in spikes. Leaves (if present) with sharp keels. Stem sometimes with three edges. Fruit is a nutlet. $\uparrow\vee\ast P_{0-6}A_{3\vee 2}G_{(\underline{3\vee 2})}$ or unisexual . . . . . Family *Cyperaceae*.

There are many smaller grass-like plant families. If your plant does not correspond well with descriptions above, it may belong to one of them. Please use other keys for identification.

Asters, daisies, composites. Herbaceous (but sometimes woody) plants which prefer open spaces to grow. Leaves alternate or opposite, without stipules. Small flowers gathered in the **flower-like inflorescence** with the receptacle and involucral bracts (which are modified leaves enveloping the inflorescence). Flowers open from periphery to center of the inflorescence. Stamens fused. Fruit seed-like achene, frequently with hairy or toothed attachment developed from sepals. $\ast\vee\uparrow K_{0\vee 5}C_{(5\vee 3)}A_{(5)}G_{(\bar{\underline{2}})}$, or unisexual, or sterile. . . . . Family *Compositae (Asteraceae)*.

Check carefully. What they think is a single flower, could actually be an *inflorescence*! If this "flower" is made of multiple but similar and compound parts, that is a first sign of Compositae.

There are many more families and sometimes genera from bigger families which exhibit similar "false flowers", for example: *Dipascus*, *Knautia*, *Scabiosa* and some other genera of Caprifoliaceae; *Jasione* from Campanulaceae; *Cephalantus* from Rubiaceae; *Eryngium* and similar from Umbelliferae; genera of Saururaceae; *Cornus* from Cornaceae; *Isopogon* and similar genera from Proteaceae; *Diplolaena* and similar from Rutaceae; *Actinodium* and similar from Myrtaceae; *Litsea* from Lauraceae, and even more. Please use other keys for their identification.

Legumes, peas. Herbaceous (in temperate regions), shrubs or trees (mostly in tropics). Leaves alternate, compound (most frequently pinnate), with pair of stipules. Flower frequently with keel and banner ("papilionate"), one of petals holds terminal position even if flower is not papilionate. Fruit is a long and narrow **pod** (legume), with two valves and no central wall. $\uparrow \mathrm{K}_{(5\vee 3)}\mathrm{C}_{[1,2,(2)]\vee(1,2,2)}\mathrm{A}_{[1,(4+5)]\vee(10)}\mathrm{G}_{\underline{1}}$ (formula of papilionate flower) . . . . . Family *Leguminosae (Fabaceae)*.

There are many legumes that do not have papilionate flower. However, structure of fruit (and pistil) is stable within legumes.

Mask-flowers: snapdragons, figworts, broomrapes, mints. Herbaceous, rarely woody. Many representatives have pubescent, quadrangular stem with opposite (sometimes alternate) leaves having pungent smell of essential oils when crushing. In flowers, the most typical combination of characters is 5 fused sepals, 4 or 5 petals making **two flower lips** (hence "mask-flowers", Personatae), 4 stamens (two are shorter) and 2-celled superior ovary. Fruit is a capsule or several (usually four) nutlets. $\uparrow\vee *\,\mathrm{K}_{(5)}\mathrm{C}_{(2,3)\vee(5)\vee(4)}\mathrm{A}_{[2,2]\vee 2}\mathrm{G}_{\underline{(2\times 2)\vee(2)}}$ . . . . . Family *Labiatae* s.ls.

Here family is understood in the **radically broad way**, it includes plants which are typically listed under Scrophulariaceae, Plantaginaceae, Lentibulariaceae, Orobanchaceae, Phrymaceae, Pedaliaceae, Bignoniaceae, Acanthaceae, Verbenaceae and some other families. Since this broad point of view is not frequent, I try to mention this families also in the strict sense.

Some "mask-flowers" are secondary non-mask, for example, plantains or ribworts (*Plantago*), they have wind-pollinated 4-merous flowers, $*\,\mathrm{K}_{(4)}\mathrm{C}_{(4)}\mathrm{A}_4\mathrm{G}_{\underline{(2)}}$, and fruits which open like teapot—with lid.

Coffees. Mostly woody with opposite leaves with intrapetiolar (between petiole and stem) stipules. Flowers frequently axillary, in fascicles. Ovary inferior, 2-merous, frequently develops into fleshy fruit, $*\,\mathrm{K}_{(4\vee 5)}\mathrm{C}_{(4\vee 5)}\mathrm{A}_{4\vee 5}\mathrm{G}_{\overline{(2)}}$ . . . . . Family *Rubiaceae*.

Melastomes. Mostly woody plants with opposite leaves without stipules and with arcuate (acrodromous) venation with ladder-like secondary veins. Flowers 5-merous, with swing stamens, arranged bilaterally (like whiskers). Ovary inferior, frequently develops into dry fruit, $\uparrow \mathrm{K}_5\mathrm{C}_5\mathrm{A}_{5+5}\mathrm{G}_{\overline{(5)}}$ . . . . . Family *Melastomataceae*.

Milkweeds, dogbanes. Herbaceous, woody climbers, or tree-like plants, frequently with milky sap. Corolla contorted in bud. Ovary superior, pistil split in two halves (secondary apocarpous), $*\,\mathrm{K}_{(5)}\mathrm{C}_{(5)}\mathrm{A}_5\mathrm{G}_{\underline{2}}$ . . . . . Family *Apocynaceae* s.l.

Some genera of Apocynaceae were in the past in their own family, Asclepiadaceae (they differ by having pollen in globules, pollinia, like in orchids).

Orchids. Herbaceous epiphytes (sometimes terrestrial herbs) with velamen (filter-paper-like tissue) covered roots. Flowers zygomorphic, stamen only one, fused with pistil to make gynostemium, pollen in globules (pollinia). In terrestrial representatives, flowers are visibly rotated 180° (resupinate). Ovary inferior, develops into dry fruit with dust seeds, $\uparrow \mathrm{P}_{3\vee[(2),1]+2,1}(\mathrm{A}_{1\vee 2}\mathrm{G}_{(\overline{3})})$ . . . . . Family *Orchidaceae*.

Columnifers, cottons. Plants woody, sometimes herbaceous, frequently with dense branched trichomes. Stems fibrous, all parts of plants contain slimes. Leaves alternate, with palmate veins. Flowers with corolla contorted in bud, and numerous stamens, frequently fused into column, $* \mathrm{K}_5\mathrm{C}_5\mathrm{A}_\infty\mathrm{G}_{\underline{(3-5)}}$ . . . . . Family *Malvaceae* s.l.

Many genera of current Malvaceae treated in the past in separate families, like Tiliaceae, Bombacaceae and Sterculiaceae.

Roses. Plants herbaceous or woody. Flowers with double perianth, non-fused corolla and numerous stamens. Multiple (or one) pistil(s) sit inside a receptacle "cup" (*hypanthium*) or on the enlarged receptacle. Leaves with paired stipules, $* \mathrm{K}_{(5)}\mathrm{C}_5\mathrm{A}_\infty\mathrm{G}_{\underline{1}} \vee \mathrm{G}_{\overline{(2-5)}} \vee \mathrm{G}_{\underline{\infty}}$ . . . . . Family *Rosaceae*

Myrtles. Woody plants, aromatic, with simple alternate or opposite leaves without stipules. Flowers 4-merous, with cup-like perianth which frequently goes away and reveals numerous attractive stamens. Ovary inferior, dimerous, $* \mathrm{K}_4\mathrm{C}_4\mathrm{A}_\infty\mathrm{G}_{(\overline{2})}$ . . . . . Family *Myrtaceae*

Crucifers, cabbages. Herbaceous plants, leaves alternate. Inflorescence is a panicle, flowers typically **cross-shaped**, yellow or white (sometimes purple), with 6 stamens (2 smaller). Fruit is usually a siliqua, pod-like but with two valves and central wall with seeds. $* \mathrm{K}_4\mathrm{C}_4\mathrm{A}_{2+4}\mathrm{G}_{(\underline{2})}$ . . . . . Family *Cruciferae (Brassicaceae)*.

Umbellifers, carrots, parsleys. Herbaceous plants. Stem is hollow. Leaves, as a rule, with large petiole sheaths, heavily dissected, alternate, contain essential oils (careful, some representatives are poisonous when digested!). Flowers small, gathered into **double umbels** (sometimes also into heads), with minute calyx and white or yellow-green corolla. Anthers come out of the disk located on the top of ovary. Fruit is a segmented schizocarp with two halves (mericarps), $* \vee \uparrow \mathrm{K}_5\mathrm{C}_5\mathrm{A}_5\mathrm{G}_{(\overline{2})}$ . . . . . Family *Umbelliferae (Apiaceae)*.

Key for the most frequent plant families

This key is for those users who prefer to use dichotomous key instead of linear list. However, it is connected with the family list anyway so when you find the name of the family, please double check it with the list. The key is also more simplified than list and does not account for the more or less unusual representatives.

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1. Inflorescence is a dense, flower-like head. Leaves without stipules, sometimes with milky sap. Calyx reduced to hairs or scales. Anthers united into the tube around the style. Fruit small, solid and dry, frequently with long hairs on the top . . . . . **Compositae**

– Inflorescences not a dense, flower-like heads . . . . . 2.

2. Leaves narrow, linear, alternate in two rows; stems cylindrical in section, usually hollow between nodes. Flowers each compressed between a bract (lemma) and bracteole (palea) . . . **Gramineae**

– Leaves narrow, linear, alternate in (usually) 3 rows; stems triangular with sharp edges (or cylindrical) in section, usually not hollow. Flowers compacted in a different way . . . . . **Cyperaceae**

= Plants with different combination of characters . . . . . 3.

3. Perianth fused . . . . . 4.

– Members of perianth free . . . . . 6.

4. Flowers zygomorphic, mask-like, with lower and upper lips. Stamens 4, two are usually longer. Ovary split in four or two parts. Leaves opposite or alternate, stems frequently quadrangular in section . . . . . **Labiatae**

– Flowers actinomorphic, star-like . . . . . 5.

5. Ovary inferior, leaves with stipules . . . . . **Rubiaceae**

– Ovary superior, leaves without stipules . . . . . **Apocynaceae**

6. Stamens more than 10 . . . . . 7.

– Stamens 10 or less . . . . . 9.

7. Stamens fused into staminal column, ovary superior . . . . . **Malvaceae**

– Stamens are not fused into column, ovary inferior or superior (but in that last case flower base is cup-like or club-like) . . . . . 8.

8. Flowers with multiple (or just one) pistil(s) sitting inside a receptacle "cup" (*hypanthium*) or on the enlarged club-like receptacle. Stamens typically are shorter than petals. Leaves with paired stipules, not aromatic . . . . . **Rosaceae**

– Flowers with inferior ovary. Stamens usually longer than petals. Leaves without stipules, aromatic . . . . . **Myrtaceae**

9. Perianth zygomorphic, with lip or banner . . . . . 10.

– Perianth actinomorphic, star-like . . . . . 11.

10. Flowers with 10 stamens, corolla 5-merous, with banner (top petal) and keel (two front petals). Ovary with one camera. Leaves compound, with paired stipules . . . . . **Leguminosae**

– Stamen only one, fused with pistil, corolla 3-merous, with lower lip. Ovary with 3 cameras, inferior. Leaves simple, no stipules . . . . . **Orchidaceae**

11. Leaves compound or highly dissected, alternate, with large petiole sheaths. Flowers small, numerous, usually white. Calyx lobes very small, almost invisible. Fruit schizocarp with two halves . . . . . **Umbelliferae**

– Leaves simple, whole or moderately dissected, alternate or opposite, without sheaths. Flowers relatively large, differently colored. Calyx lobes well visible. Fruit does not have two halves . . . . . 12.

12. Ovary superior. Stamens 6, simple, two of them are smaller than others. Leaves alternate, venation irregular . . . . . **Cruciferae**

– Ovary inferior. Stamens 10, complicated, swing-like, more or less equal. Leaves opposite, with "arc-and-ladder" venation (veins of first order arc-shaped, connected with much smaller numerous parallel veins of the second order) . . . . . **Melastomataceae**