The subclass Rosidae

The subclass Rosidae includes 39 orders and about 170 families. The representatives of the orders are different in the external appearance and anatomical structure of vegetative organs. They are united by their origin. The Rosidae are descended from the ancient Magnoliidae. At the same time, the most archaic ones are related to Dillenidae. Which suggests a common origin of the Rosidae and Dillenidae.

Ancient Rosids have an actinomorphic flower, free corolla, apocarpic gynoecium, numerous stamens. The specialized ones have a zygomorphic flower, a corolla with fused petals, and an oligomeric gynoecium.

Rosidae represents a natural, unified phylogenetic branch of evolution.

All life forms are found among the Rosidae. They can be grasses, shrubs, and trees. Leaves are alternate, opposite, or whorled, with or without leaflets, simple or compound. Stomatal apparatus is more often anomocytic, but sometimes others are found.

The most primitive Rosidae belong to the order Saxifragales. This order includes families *Saxifragaceae* (*Bergenia crassipholia*), *Crassulariaceae* (Kalanchoe (*Bryophyllum pinnatum*)), *Grossulariaceae* (Currants (*Ribes nigrum*) and Gooseberries (*Grossularia uva-crispa*)), etc.

The order includes 3 families; of which we will consider the family *Rosaceae*. This order has a common origin with the *Saxifragaceae*.

The *Rosaceae* family includes about 100 genera and 3,000 species.

Rosaceae are distributed all over the Earth, but the greatest diversity is concentrated in temperate climates. They are evergreen and deciduous trees, shrubs, and grasses. Leaves are often alternate, less often opposite, with stipules. Inflorescences are more often botryoid: brushes, spikes, umbrellas, shields. Less often cymoid. The perianth is double, more often 5-parted, less frequently 4-parted. The calyx is fused. Corolla is loose. A characteristic feature of the family is the presence of the hypanthium. Hypanthium is a structure resulting from a fusion of bases of sepals, petals, and stamens with tissues of the receptacle. The shape of the hypanthium can be different: saucer-shaped, bell-shaped, pitcher-shaped. In some plants, the hypanthium is involved in the formation of the fruit (rosehip). The number of stamens is indeterminate or 2-4 times more than the number of petals. The gynoecium varies from one to ∞, apocarpic, monocarpic or syncarpic.

There are 4 subfamilies in the family *Rosaceae: Spiraeideae*, *Rosoideae*, *Prunoideae,* and *Malaideae.*

Comparative signs of subfamilies family *Rosaceae*

Signs	***Spiraeideae***	***Rosoideae***	***Malaideae***	***Prunoideae***

Number of carpels	∞ - 5(1)	∞, rarely – 5	5 - 8	1
Gynoecium	apocarpic	apocarpic	syncarpous	monocarpic
Ovary	superior	superior	inferior	superior
Fruits	etaerio follicles	etaerio follicles, etaerio of achenes etaerio of drupelets, Utricle, cynarrhodium	pome	drupe
Form of receptacle	flat	flat, convex, concave	concave	cupped
Subcalix	missing	available	missing	missing
Formula of flower	*$Ca_{(5)}Co_5A_\infty G_{\underline{6\text{-}10}}$ *Filipendula ulmaria*	*$Ca_{(5)}Co_5A_\infty G_{\underline{\infty}}$ *Rosa canina*	*$Ca_{(5)}Co_5A_\infty G_{\overline{(5)}}$ *Malus domestica*	*$Ca_{(5)}Co_5A_\infty G_{\underline{1}}$ *Prunus spinosa*
Leaves	simple	compound, less often simple	Simple or compound	simple
Stipules	Without stipules	With stipules	With early falling stipules	With early falling stipules
Life form	shrubs	herbs, less often – shrubs	trees, shrubs	trees, shrubs
Genus	*Filipendula, Spiraea*	*Rosa, Rubus, Fragaria, Potentilla,*	*Malus, Pyrus, Sorbus, Crataegus*	*Cerasus, Prunus, Armeniaca, Persica, Amigdalus, Padus,*

In *Spiraeideae*, the ovary is upper and the fruit is a dry etaerio follicle. The ovary is also upper in the flowers of *Rosoideae* proper, but their fruit is an etaerio follicle, etaerio of achenes, etaerio of drupelets, utricle, cynarrhodium, and often the hypanthium participates in its formation. *Prunoideae* also has an upper ovary, but their often tubular or bell-shaped hypanthium does not participate in the formation of a drupe fruit, but withers and falls off. On the contrary, *Malaideae* has a lower ovary, and hypanthium is involved in fruit formation. Therefore, their mature fleshy fruits, called pome (apples), have dried sepals on top.

Most members of the family *Rosaceae* are economically important fruit, berry, ornamental, forest-protecting, forest-meliorative, and honey-bearing plants.

The subfamily *Spiraeideae* includes about 20 genera and 180 species, which mainly grow in the northern temperate zone. They are shrubs with alternate buds, simple or compound leaves, small flowers aggregated in broom or scutellum, and fruits - an etaerio follicle. Their core is white, less often brownish; wood is white or pale green. Most species are mainly ornamental.

Subfamily *Malaideae* includes 22-23 genera and about 600 species of

deciduous or evergreen trees and shrubs that are mainly found in temperate and subtropical zones of the northern hemisphere. Buds are alternate, leaves are simple or compound, semi-pinnate, flowers are solitary or in inflorescences, with 20 or more stamens and ovary of 2-5 fruiting carpels. The fruit is a pome (apple) or berry-like. Important genera of this subfamily are apple, pear, cotoneaster, mountain ash, chokeberry, hawthorn, and quince. All *Malaideae* are of great food value, ornamental, and widely used in landscaping; they are good honeybees.

The subfamily *Rosoideae* is the largest among the *Rosaceae* and includes 50 genera and about 1,700 species, mostly of shrubs and herbs, often with branches studded with compound leaves and stipules and regular flowers with numerous stamens and pistils. Fruits are etaerio of achenes or etaerio of drupelets. The subfamily includes genera *Rosa* (rosehips) and *Rubus* (raspberries).

Subfamily *Prunoidea* includes 10-11 genera and more than 400 species of deciduous or evergreen trees and shrubs, distributed mainly in temperate and subtropical zones of North America and Eurasia. They are woody plants with simple, entire leaves and deciduous stipules. Flowers are pentamerous with 10-20 or more stamens and with one carpel (unlike the rest of the *Rosaceae* subfamily). Fruits are drupe with juicy or leathery pulp and stony endocarp. The subfamily includes the following genera: plum (*Prunus*), cherry (*Cerasus*), almond (*Amygdalus*), bird cherry (*Padus*), apricot (*Armeniaca*), peach (*Persica*), which have long been valued as fruit, decorative, medicinal, and honey-bearing plants.

Fruits of *Rosaceae* are diverse. In *Spiroidae* and *Rosoidaea*, they are apocarpous, etaerio of follicles, etaerio of achenes, etaerio of drupelets and their variations; in *Prunoidaea*, monocarpic, drupes; in *Maloideae* syncarpous, pome (apples) and berry-like apples. Many *Rosaceae* plants are characterized by the formation of so-called "False fruits" when not only ovary but other flower parts take part in fruit formation (rose hips have hypanthium, such fruit is called cynnarhodium, strawberries have strawberry or fraga (urticle), apple trees have hypanthium and flower sprout - pome).

Many representatives are used in medicine. Rosehips as a source of vitamin C, rhizomes of *Sanguisorba officinales* and *Potentilla erecta* - tannins, apricot, peach and almond pips - for a fatty oil, etc.

The order Legumes (*Fabales*)

The order Legumes (*Fabales*) includes only one family, *Fabaceae* or *Leguminosae*. One of the largest families of Flowering plants, uniting 17000-18000 species and approximately 650 genera. They are trees, shrubs, semi-shrubs, and herbs. Leaves are mostly alternate, usually compound, in most cases with stipules. Leaflets of compound leaves are usually entire and rounded, elliptical, or lanceolate. Flowers are axillary, actinomorphic, or more often zygomorphic. Sepals are fused. Petals are loose or the two anterior ones are fused, like a boat. Stamens are usually 10 and free or fused by filaments in one or two bundles. The

gynoecium is monocarpic, the ovary is upper, the fruit is a legume. Seeds have straight or curved (in *Faboideae*) large embryos and no endosperm. Nutrients are accumulated in the cotyledons.

The family is usually divided into three subfamilies: the *Mimosoideae,* the *Cesalpiniaideae,* and the *Faboideae*.

Subfamilies *Mimosoideae*. Representatives of this subfamily are distributed mainly in the tropics and subtropics. Leaves are more often bipinnate and consist of numerous leaflets, the number of which may reach hundreds or even thousands. Leaflets have special thickenings at their bases, pads, which actuate leaflets and leaves when their turgor changes. Their flowers are actinomorphic. The corolla is not conspicuous. Stamens are loose, they often split, and then the androceum appears polymeric. The flowers are relatively small in size, but they are gathered in dense inflorescences. The stamens become stiff and protrude from the corolla. They produce an excessive amount of pollen, which makes the flowers attractive to insects.

Acacia dealbata *$Ca_{(5)}Co_5A_\infty G_1$

Subfamilies *Caesalpinioideae* have bipinnate leaves, very rarely false simple (the upper pair of leaflets fused into one) or trifoliate. Leaflets of the compound leaf are large. Representatives of this subfamily are characterized by cauliflorum when flowers and fruits are formed directly on trunks. Flowers are zygomorphic; the calyx is fused. Its petals are free, four of which are arranged in pairs, forming a kind of boat and oars, and the fifth is the largest - a sail or flag. In *Caesalpinioideae*, this petal is in the inner circle. The stamens are free and often have different lengths.

Cercis siliquastrum ↑$Ca_{(5)}Co_{(2+1+2)}A_{10}G_1$

Subfamilies *Faboideae*. The largest genus of flowering plants, *Astragalus*, belongs to this subfamily. Leaves are more often unpinned. Stipules of some species are very large and perform the function of photosynthesis. Many plants are climbing or clinging. Their leaf parts (more often the upper leaflets) turn into tendrils, which make circular movements in search of a foothold, and then keep the plant on it. Flowers are zygomorphic, with a very characteristic structure. They resemble *Caesalpinia* flowers, but the "sail" is in the outer circle and the petals forming the "boat" are fused. The stamens are either all fused, or nine are fused and one remains free.

Robinia pseudoacacia ↑$Ca_{(5)}Co_{1+2+(2)}A_{9+1}G_1$

Order *Myrtales*.

This order includes 16 families, distributed mainly in the tropics and sub-tropics. They are descended from the oldest *Saxifragaceae*. These are trees, shrubs, and herbs with opposite and less often alternate, usually entire leaves, usually without stipules. Flowers are more often bisexual, cyclic, 4- or 5-parted with a developed floral tube.

Flowers are more often uterine, cyclic, 4- or 5-parted with a developed floral tube, actinomorphic or zygomorphic. The gynoecium is syncarpous, with fully fused styles.

Family *Myrtaceae*. This family includes 145 genera and at least 3,600 species. This family includes myrtle and eucalyptus.

All myrtles are evergreen, often very large trees, and shrubs. Their leaves are opposite, less often alternating, dense leathery, usually entire, without stipules. Very often they bear prominent macules, which are cavities of essential oil. Flowers are actinomorphic, bisexual. The perianth is double. Often the entire perianth, calyx, or corolla completely fuse, forming a cap, or calyptra, which falls off when the flower opens. Stamens are numerous, free. The gynoecium consists of 2-3 fused carpels. The ovary is lower or semi-lower. The style of the ovary is single, long, ending in a cephalic stigma.

Eucalyptus $*Ca_{(5)}Co_5A_\infty G_{(3)}$ –

Fruit syncarpous: berry, nut, drupe, or capsule. Seeds with or without scanty endosperm.

Most *Myrtaceae* contain essential oils that are used medicinally. Common myrtle (*Myrtus communis*) is cultivated for its essential oils and its green and dried fruits are used as a condiment in cooking. Guava (*Psidium*) fruits are used for food and are rich in vitamins. Clove tree (*Syzygium aromaticum*) buds are used as a spice and the essential oil in dentistry.

Family *Onagraceae*

This family includes approximately 17 genera and 680 species. Representatives of this family are distributed throughout the world. The most famous representative is the narrow-leaved Ivan-tea (*Chamaenerion angustifolium*).

Most *Onagraceae* herbs have simple, entire, opposite, or alternate leaves without stipules.

Flowers are actinomorphic or weakly zygomorphic. The perianth is double, with 4 or 2 sepals, which may be free or fused. Stamens are arranged in 1 or 2 circles, of which usually 4 are longer than the others. Nectaries are located between the expanded base of the stamen threads and the base of the column. A great deal of nectar is secreted. The gynoecium consists of 4 fused carpels. The ovary is inferior, the fruit a capsule, opening downward with four cusps. Seeds are usually equipped with tufts of long hairs and are spread by the wind.

Chamaenerion angustifolium has a well-pronounced protandruosity. Nectaries are located between the expanded base of the stamen threads and the base of the column. A great deal of nectar is secreted. The gynoecium consists of 4 fused carpels. The ovary is inferior, the fruit a capsule, opening downward with four cusps. Seeds are usually equipped with tufts of long hairs and are spread by the wind.

Cypress has a well-pronounced protandruosity. Flowering is prolonged.

When the anthers ripen, the stigma is closed and curved downward. After the anthers finish dispersing pollen, the style is straightened, elongated, and opens with a four-lobed stigma.

Chamaenerion angustifolium ↑$Ca_{(4)}Co_4A_8G_{(4)}$

Order *Rutales*

This order includes 17 families, distributed mainly in the tropics and subtropics. They are trees, shrubs, and herbs. Leaves are often compound, less often simple, more often without stipules. Flowers are more often bisexual, with a double perianth and 2 circles of stamens. The gynoecium is sometimes apocarpic, but for the most part syncarpous. Often a nectar disc develops.

Family *Rutaceae*.

Includes 150 genera and 1600 species, distributed in the tropics and subtropics. The best-known members of the genus *Citrus* are mostly trees and shrubs, less often herbs. Leaves are compound, simple, or secondarily simple, and the leaf arrangement is alternate, less often opposite. Leaves have a large number of cavities in the form of translucent dots with essential oils. Inflorescences are cymoid, sometimes with single flowers in the leaf axils. Perianth double, 4- or 5-membered; sepals and petals are usually loose or fused to varying degrees. Loose stamens are 10 or 8. Sometimes stamens are numerous, aggregated in groups of several. The gynoecium is syncarpous, with 4-5 (sometimes more) carpels. The ovary is superior. Fruits are capsules (*Dictamnus albus*), drupes (*Phellodendron amurense*), hesperidia (*Citrus*).

Ruta graveolens *$Ca_5Co_5A_{5+5}G_{\underline{(5)}}$

Citrus *$Ca_5Co_5A_{\infty}G_{\underline{(\infty)}}$

Family *Anacardiaceae*.

About 600 species and about 80 genera. Representatives live mainly in the tropics and subtropics. The most known representatives are real pistachio (*Pistacia vera*), mango (*Mangifera indica*), *Cotinus coggygria*, and *Rhus coriaria*.

They are trees, shrubs, less often lianas. Many contain resinous and tannic substances. Leaves are compound, less often simple, alternate, without leaflets. Flowers are actinomorphic. The perianth is double, usually consisting of five fused sepals and five free petals. They have five or ten stamens. There is a massive nectar disk between the stamens and the ovary. The gynoecium is syncarpous, consisting of 3 fused carpels, which form the upper three-locular ovary.

The fruit is pseudomonocarpic, a nut.

Cotinus coggygria *$Ca_{(5)}Co_5A_5G_{\underline{(3)}}$

Order *Sapindales*.

This order has a common origin with the *Rutales*. They are trees, shrubs, and herbs. Their leaves are compound or simple, pinnate, palmate, without leaflets.

Flowers are bisexual or unisexual, with a double perianth. The nectar disc is well developed. The gynoecium is more often syncarpous. Includes 12 families.

The family *Hippocastanaceae*.

This family includes two genera that include 15 species of woody plants.

Horse chestnut (*Aesculus hippocastanum*) is a striking representative. The leaves are opposite, palmate-compound. The flowers are irregular, asymmetrical.

The upper flowers in the inflorescence are functionally male, the others are bisexual. The perianth is double, the calyx consists of 4 to 5 sepals fused at the base, the corolla consists of four loose petals. There is an irregular nectar disk between the corolla and the androceum. Stamens are 5-8, free, extensively protruding from the flower. The gynoecium is syncarpous, with 3 fused carpels. The ovary is upper. The fruit is a one-seeded capsule, opening with three valves.

The seeds contain saponins.

Aesculus hippocastanum $\uparrow Ca_{(5)}Co_{4\text{-}5}A_{5\text{-}8}\underline{G_{(3)}}$

Order *Linales*.

This order includes 6 families, of which the largest is the flax family.

Family *Linaceae*. This family includes 6 genera and about 250 species. They are widely distributed on Earth but are more common in temperate and subtropical regions. Most often they are grasses. *Linaceae* leaves are simple, alternate, entire. Flowers are five-membered, regular, bisexual, in apical inflorescences. The perianth is double. Petals and sepals are loose. Androceum consists of one or two circles (in the first case, there are 5 and 10 loose stamens in the second). The bases of stamens are often somewhat dilated and united in a ring. There are small staminodes between normal stamens in the one-circle androceum. The gynoecium is syncarpous, with five carpels; the styles are free. The upper ovary is partially or entirely divided into locules. Heterostyly is characteristic of *Linaceae*. The fruit is most often an opening capsule. Seeds have an endosperm and a direct embryo. The outer layer of cells of the seed coat usually contains mucus, which promotes seed dispersal and protects the germinating embryo.

Common flax (*Linum usitatissimum*) is one of the oldest cultivated plants and is not known in the wild. Three groups of flax varieties are known: long-stemmed flax, which is cultivated to produce spinning fibers, flax curly flax, and middle flax, cultivated for the sake of the fatty oil contained in the seeds.

In medicine, flax seeds are used as an ambulant. Some antisclerotic drugs are obtained from fatty oil.

Linum usitatissimum $*Ca_5Co_5A_5\underline{G_{(5)}}$

Order *Rhamnales*.

This order contains only one family, the *Rhamnaceae*.

There are 60 genera and about 900 species in the family. In Russia, the most famous representatives are brittle buckthorn (*Frángula álnus*) and laxative *Rhamnus cathartica*. Most of the *Rhamnaceae* are bushes and lianas, but there are also cushion-shaped shrubs, large trees, and even annual grasses. Leaves of *Rhamnaceae* are opposite, less often alternate, in most cases normally developed, with stipules. Often there are sharp spines and thorns formed from modified shoots.

Flowers are small, unsightly, aggregated in axillary cymoid inflorescences, actinomorphic, 4-5-segmented, bisexual, or unisexual, and then the plants are dioecious, with a double perianth. The calyx has fused sepals. Petals are enclosed by opposing stamens. The ovary is upper or lower, formed by 2-4 fruiting carpels, surrounded or covered by a nectar disk.

Fruits are syncarpic drupes or schizocarpia. Dry fruits often have various wings and are spread by the wind. The candy tree, which grows in East and Southeast Asia and is cultivated in botanical gardens in Transcaucasia and Crimea, has fruit sitting on fleshy, sprawling, sweet-tasting, brightly-colored peduncles.

Many *Rhamnaceae* contain anthracene derivatives. Preparations of *Frangula* and *Rhamnus* are used in medicine as a laxative. The candy tree and Chinese date (Yuyuba) with its fleshy fruits and pedicels are grown as fruit trees.

Rhamnus cathartica *$Ca_{(4)}Co_4A_4\underline{G_{(0)}}$ *$Ca_{(4)}Co_4A_0\underline{G_{(4)}}$

Frángula álnus *$Ca_{(5)}Co_5A_5\underline{G_{(3)}}$

Order *Elaeagnales*

This order includes only one family *Elaeagnaceae*. There are 3 genera and about 55 species in this family. The most famous representatives belong to the genera *Elaeagnus* and *Hippophae*. They are distributed mainly in the northern hemisphere. All species of this family have nodules on their roots, in which nitrogen-fixing bacteria settle, allowing the sucker to inhabit very poor soils. *Elaeagnaceae* are small, usually prickly trees or shrubs with characteristic pubescence of scales and stellate trichomes. Leaves of the loch are simple, entire, compound, alternate, or opposite, without stipules.

Flowers are regular, solitary, or in bunches. They are either bisexual or unisexual, in which case the plants are dioecious. The perianth is simple, consisting of a calyx. The sepals are fused, while female and bisexual flowers are tubular, male ones are almost flat. Stamens in bisexual and male flowers are 4 (8) and attach to the inner surface of the calyx. The gynoecium consists of single carpels with a relatively long style column bearing a cephalic stigma. The fruit is monocarpic, achenes or drupes. The seed is single, with a direct embryo, without an endosperm.

Elaeagnus angustifolia is widely used in field-protecting forestry. Fruits of *Hippophae rhamnoides* are widely used in medicine as sources of vitamins and fatty oil with high pharmacological activity.

Hippophae rhamnoides *$Ca_{(2)}Co_0A_4G_{(0)}$ *$Ca_{(2)}Co_0A_0G_{(1)}$

Elaeagnus angustifolia *$Ca_{(4)}Co_0A_4G_{\underline{(1)}}$

Order Umbrella - *Apiales*

This order includes two large families, the *Apiaceae* and the *Araliaceae*, and a small family, the *Helvingiaceae*.

Family *Araliaceae*

This family includes about 850 species belonging to about 80 genera.

In Russia, the *Araliaceae* are found in the south of the Far East. This family includes such famous plants as ginseng (*Panax ginseng*), *Eleutherococcus senticosus, Oplopanax elatus, Hedera helix*, and *Aralia mandshúrica*.

Among the *Araliaceae*, shrubs and small trees predominate, although lianas and perennial grasses occur. Most of them are characterized by alternate palmately compound and pinnatipartite leaves. Leaves are often arranged close together at the top of weakly branched shoots. Shoots are often covered with thorns. Petioles encircle the shoot with wide bases, leaving a sickle-like trace after leaf drop.

Flowers are small, unsightly, actinomorphic, aggregated in complex inflorescences consisting of simple umbels. Sometimes the inflorescence is reduced to a single simple umbel (ginseng). Flowers are usually bisexual, with a double perianth. The ovary is inferior, covered with a nectar disk. The flowers are pollinated by insects.

Fruits are syncarp-shaped drupes with 2-5 seeds. Seeds have a small embryo and abundant endosperm.

The representatives of the family contain triterpene saponins and diterpenoids. In medicine, *Panax ginseng*, *Eleutherococcus senticosus*, *Oplopanax elatus*, and *Aralia mandshúrica* are used as a tonic and restorative agents.

Hedera helix $*Ca_{(5)}Co_5A_5G_{\overline{(5)}}$

Panax ginseng $*Ca_{(5)}Co_5A_5G_{\overline{(2)}}$

Family *Umbelliferrae* or *Apiaceae*.

Umbelliferrae is a large family including about 300 genera and 3,000 species. Among the *Umbelliferrae* there are many well-known plants used as food: carrots, celery, dill, anise, cumin, parsley, fennel, etc.

Umbelliferrae is distributed all over the Earth, but the vast majority of them live in temperate and subtropical countries. *Umbelliferrae* plants are dominated by perennial herbs, occasionally annuals, shrubs, and species that form dense turf.

Umbelliferrae stems are well dissected into nodes and internodes. The internodes are often hollow, with secretory ducts containing essential oils and resinous substances. Leaves are always simple, without stipules, usually strongly dissected into relatively narrow terminal lobes, rarely entire. Their bases are widened, forming sheaths that encircle the stem. Stem leaves are alternate, ground ones often forming a rosette.

Flowers are small, actinomorphic, bisexual, aggregated in compound umbels, or (very rarely) in heads.

The flower structure is rather monotonous. The perianth is double, pentamerous. Calyx teeth are short, inconspicuous in most cases. The petals are loose. Stamens are always five, attached to the glandular disk and alternating with the petals. The gynoecium is syncarpous, fused of two carpels, which form the lower bilocular ovary, each socket of which contains one developing ovule. At the top of the ovary, there is a glandular disk called substyloid, from which two styles end in inconspicuous stigmas.

The fruit is syncarpous, called the schizocarp. It consists of two semi-fruitless (mericarps), which, when the fruit matures, separate and remain suspended for some time on a forked branching column formed by the ventral part of the carpels and called a carpophore. The ventral side of the mericarps is called the commissure or commissure. On their outer (dorsal) side, there are 5 main, or primary, ribs. In the spaces between the primary ribs, called ridges, there are sometimes secondary ribs. In the mesocarp, there are longitudinal ether-oil secretory ducts, usually located under the spoonfuls and on the commissural side. The seed is single, fused with the pericarp, has an oily endosperm, and a relatively small embryo.

Essential oils, resins, coumarins, furocoumarins, chromonocoumarins, triterpenoid saponins, and acetylene derivatives are frequently found in various parts of the *Umbelliferae* plant family. Alkaloids are rare, such as coniin in the poisonous umbrella *Conium maculatum*.

Among the umbrellas are many useful plants. This family provides the bulk of seasonings and spices to the inhabitants of temperate climates.

Apium graveolens (celery) $*Ca_5Co_5A_5G_{\overline{(5)}}$

Order *Dipsacales*

This order includes six to seven families. We will take a look at two of them.

Family *Caprifoliaceae*.

This family includes 15 genera and about 550 species of deciduous or evergreen shrubs, small trees, bushes, and grasses. *Caprifoliaceae* is distributed mainly in temperate and even cold climates of the northern hemisphere with a few representatives occurring in the mountain tropics.

Well, known is the common guelder rose (*Viburnum opulus*), a small tree

with palmate-lobed leaves and bunches of red fruits. Another common plant of the southern regions of the European part of the CIS and Transcaucasia, black elderberry (*Sambucus nigra*), also belongs to the *Caprifoliaceae* family.

Caprifoliaceae is characterized by entire, opposite leaves, sometimes fused at their bases in a flat wrapper surrounding the stem, with or without stipules. Inflorescences are usually raceme-like, corymbiform, or paniculate cymoid, but sometimes simplified to two or even a single flower in the leaf axil.

Flowers are more or less zygomorphic or almost actinomorphic. In the majority of cases, they are bisexual, but common guelder rose and some closely related species have two types. Flowers, which occupy the central part of the corymb-like inflorescence, are relatively small, normally developed, i.e., having stamens and pistils, while marginal ones are large, bright, sterile. Perianth of *Caprifoliaceae* double. The calyx forms a short tube, fused with the lower ovary and has a five- to three-cut bend separated from the tube by a constriction. The corolla has fused petals, which are tubular, bell-shaped, or wheel-shaped. Similar to the calyx, it is three- or five-lobed, often biceps, sometimes with a pouch-like swelling at the base of the tube. Stamens are 5, less frequently 4 (*Lonicera*) or 3 (*Sambucus*), attached to the corolla tube. The gynoecium is syncarpous. The ovary is lower. Sometimes the gynoecium becomes pseudomonocarpous, i.e., it has one nest with a single ovule. Fruit is syncarpous, frequently berry, and ovaries and berry-like fruits very often partially or almost entirely accreted in pairs, forming an elementary infructescence; less frequently an opening capsule or dry unopened fruits. Seeds are usually relatively small, with a straight embryo and abundant endosperm.

Viburnum opulus $*Ca_{(5)}Co_{(5)}A_5\underline{G}_{(5)}$

Among *Caprifoliaceae* plants, species containing valerian acid (related to valerian family), iridoid aucubin, saponins, coumarins, and cyanogenic glycosides have been found.

The economic importance of *Caprifoliaceae* e is relatively small. Their solid and beautiful wood is used for small articles. Many species are cultivated as ornamental shrubs and lianas.

Family *Valerianaceae*

It is a small family with 13 genera and more than 400 species of mostly herbaceous plants, about half of which account for the genus *Valeriana*. *Valerianaceae* is most abundantly represented in arid regions of Eurasia and South American Andes, but completely absent in Australia, Oceania, and most parts of Africa.

Rather complete concept of the *Valerianaceae* species is given by the common plant of our flora - *Valeriana officinalis*, a tall herbaceous perennial with a thick short rhizome and adventitious roots having a characteristic odor, which is due to the presence of isovaleric acid and its derivatives in them. The valerian plant's root system dies out almost completely each year and is built anew the

following year using dormant root buds.

Leaves of *Valerianiaceae* are simple, opposite, without stipules, not infrequently dissected to one degree or another.

Flowers are usually bisexual, asymmetrical, in cymoid inflorescences of varied appearance. The perianth is double, pentamerous, but the calyx, which covers the lower ovary, is usually strongly reduced in its free part and transformed into an above the pistillate ring, which swells up under fruit. In valerian calyxes, the inconspicuous denticles turn into white tufts which promote fruit dispersal through the wind. The corolla of the *Valerianaceae* is tubular or funnel-shaped with fused petals and a five-lobed branch. At the base of the corolla tube, there is a sac-like swell on one side, inside which are hairs. This prominence and 3 or 4 asymmetrically arranged stamens make the flower entirely asymmetrical. The threads of the stamens are attached to the corolla tube and alternate with its lobes

The gynoecium is syncarpous, formed by three fused carpels, of which only one normally develops, with a single ovule. The ovary is lower. The style is single, simple, ending in a three-lobed stigma.

Fruit is syncarpous or pseudomonocarpic (valerian), achene, usually with a tuft of hairs or a sprawling bracteal leaf. Seeds have no endosperm, with a direct embryo.

Many *Valerianaceae* plants contain isovaleric acid esters, alkaloids, and iridoids. The medicinal value of *Valerianas* are well known, having been used since antiquity. Its preparations are used as a sedative. Some types of *Patrinia*, often used in traditional Oriental medicines, have a similar effect. Some *Valerianaceae* plants contain aromatic substances and have been used for a long time in perfumery, in addition to their medical use.

Valeriana officinalis. $\uparrow Ca_{(0)} Co_{(5)} A_3 G_{\overline{(3)или(1)}}$