MORPHOLOGY AND TAXONOMY OF GRAPEVINES

Morphology

Roots— diffuse and fibrous, often growing to great depths in search of water. Feeder roots are continually produced during the growing season and as they mature become part of the root system.

Trunk— permanent stem of the vine, can branch into cordons. **Cordons** are named after their rope-like nature. Arms come off the trunk or the cordons and the spurs arise from the arms. Vines may be **head trained** or **cordon trained**. The cordon arrangement can vary— unilateral, bilateral and quadrilateral.

Spur— the short fruiting unit of one year's growth, usually consisting of the 2 to 3 nodes retained after pruning.

Shoot— arise from the spurs in the current season of growth, and become canes as they mature.

Canes— carry this year's fruit and produce buds for next year's fruit. The canes have nodes and internodes, the **nodes** are the areas from which leaves, tendrils, and clusters arise. The **internode** is the region between the nodes. A **diaphragm** of woody tissue interrupts the node of most *Vitis* species.

Buds— every leaf axil (the point where the leaf is attached to the shoot) has an **axillary** or **lateral** bud. This bud grows out to become a shoot in the current season or drops off. A **dormant** or latent bud forms in the basal axil of the lateral bud, and develops during the year to become the large woody bud that produces the next year's canes. Clusters are noticeable within the dormant bud by July and they form next year's crop.

Tendrils— act to support the vine and are produced opposite the leaves. They are undeveloped clusters and are usually produced in a **discontinuous** manner (2 nodes with, 1 node without) on the cane.

Leaves— are attached to the shoot/cane by the **petiole**. The **blade** or lamina is the expanded part of the leaf. The leaf **bracts** are small scales at the base of the petiole and they drop off early in development.

Diagnostic leaf features are: the 5 major veins that radiate out from the petiole and produce a **palmate** leaf; the teeth or **serrations** at the leaf edge; the **sinuses**, petiolar, lateral (inferior towards the petiole and superior away from it); the **lobing** from entire to deeply lobed.
The leaf surface can be **smooth**, **rugose** (wrinkled), **concave** (or pinched), or **convex** (rolled over).

Hairs on the leaf— primarily seen on the lower surface and on the shoot tips. Ranges from **glabrous** (hairless) to randomly placed hairs, to **cobwebby**, to **downy**, to **felty**; leaves are also described as **pubescent** (peach fuss, fine short hairs) and **tomentose** (covered with soft wool-like hairs).

Clusters— are the bunches of fruit held to the trunk by the **peduncle**, which develops into the **rachis**, the framework of the cluster, and ends in the **pedicel**, the berry stem. Cluster shapes are diagnostic and are determined by the length of the branches within the

rachis. There can be a large lateral branch in the rachis near the peduncle that causes the cluster to be described as **shouldered** to **winged** to **double clustered**, depending on the lateral branch size.
The number of berries that set or form determines how well the cluster is filled. **Loose**, **well-filled** and **compact** describe clusters, these are diagnostic terms, but are also environmentally modified.

Berries— the fruit of the grapevine is a **berry**, it is held to the cluster by the pedicel or **capstem**. They range widely in shape from variety to variety and can be diagnostic. Small pores surrounded by woody tissue can be seen on the berry surface, and on the pedicels called **lenticels**. When the style abscises from the berry it can leave a scar, the **stylar scar**, at the berry apex. The **bloom** is the waxy coating on the berry epidermis.

Ampelography— grapevine identification, using leaves, shoot tips and fruit morphology. Important for: 1. planting decisions, 2. winery decisions, 3. veracity of winery and nursery shipments, 4. avoiding nomenclatural mistakes.

Classically ampelography is a practiced art dependent upon learned recognition. Galet has developed a system using a protractor to measure leaf vein angles, but it seems cumbersome. Computer packages are now in the works.

TAXONOMY

Plants are classified according to a **binomial** system consisting of a uniting **Genus** name followed by a **species** name. These are usually latinized and are underlined or italicized.

Grapes are in the genus *Vitis* and the European bunch grape of wine and table grape familiarity is *Vitis vinifera*. *Vinifera* can be divided into several subspecies, *sylvestris*, *orientalis* (caucasia) and *sativa*. Horticulturists call types within the *sativa* (cultivated) subspecies varieties or cultivars.

Botanists divide *Vitis* into two subgenera, sections or even different genera to separate the muscadine grapes from all the others, ***Vitis* and *Muscadinia*.**
V. rotundifolia is also called *Muscadinia rotundifolia*, it has a different chromosome number, different bark and tendrils, different clusters, and very different flavor. It also forms sterile hybrids with vinifera.

Similar genera are grouped into families. There are 12 different genera in the family that encompasses *Vitis*, **Vitaceae**. Other common genera in Vitaceae are *Cissus* (Kangaroo Ivy), *Parthenocissus* (Boston Ivy), and *Ampelopsis* (Pepper Vine).

There are about 60 Vitis species worldwide with **three centers of origin for the genus: Middle East** (*vinifera* and *lanata* (*Jacquemontii*)); **China** (at least 20 species including *amurensis*); and **North America** (and perhaps Central America).

There are **about 30 different *Vitis* species in North America,** separated by ecological and phenological niches; all hybridize freely except (for *rotundifolia*).

***Vitis* species that are used as fruiting varieties or in hybrid production are:**
vinifera— European bunch (wine/table) grapes
labrusca— the Fox Grape, Concords (X *Labruscana*), Welch's grape juice, NE USA
rotundifolia— Muscadine grapes, SE USA
aestivalis— Summer Grape, used in hybrids, E USA

riparia— Frost Grape or Streamside Grape, used in hybrids, and as a rootstock, E of Rocky Mtns.
amurensis— a Chinese species with great cold and disease tolerance, used in China for jams and jellies, now being hybridized

***Vitis* species used as rootstocks or in rootstock hybrids:**
rupestris— Sand Grape, George, AXR#1, 110R, 3309, phylloxera and drought tolerance
riparia— pure species rootstock, Riparia Gloire, and in hybrids SO4, 3309
Berlandieri— the Spanish Grape, Texas limestone soils, phylloxera tolerant, lime tolerant, hard to root and graft so used as hybrids, SO4, 110R and very popular in France
Champinii— Calcaire Grape also in Texas limestones, high nematode resistance, SJV rootstocks Dogridge and Salt Creek

Other species:
californica— the northern Californian grape species
Girdiana— the southern Californian counterpart

French Hybrids, or Hybrid Direct Producers— vinifera wine quality with resistant roots, the first response to the phylloxera problem, resistant roots and *vinifera*-like fruit. Soon went to rootstocks. Authorized French hybrids— Seyval, Baco noir, and Baco blanc. Widely used in the NE USA and Canada to produce wine under conditions too cold or disease prone for vinifera.

American Hybrids— bred primarily for cold and disease resistance, but also had to have phylloxera resistance and good fruit quality. *Labrusca* hybrids and Concord are the main stay of USA areas in which *vinifera* will not grow, but fruit quality is always in question. Efforts have been directed at producing *vinifera*-like fruit with cold and disease resistance. Other American Hybrids are Delaware, Isabella, Catawba, and Niabell.