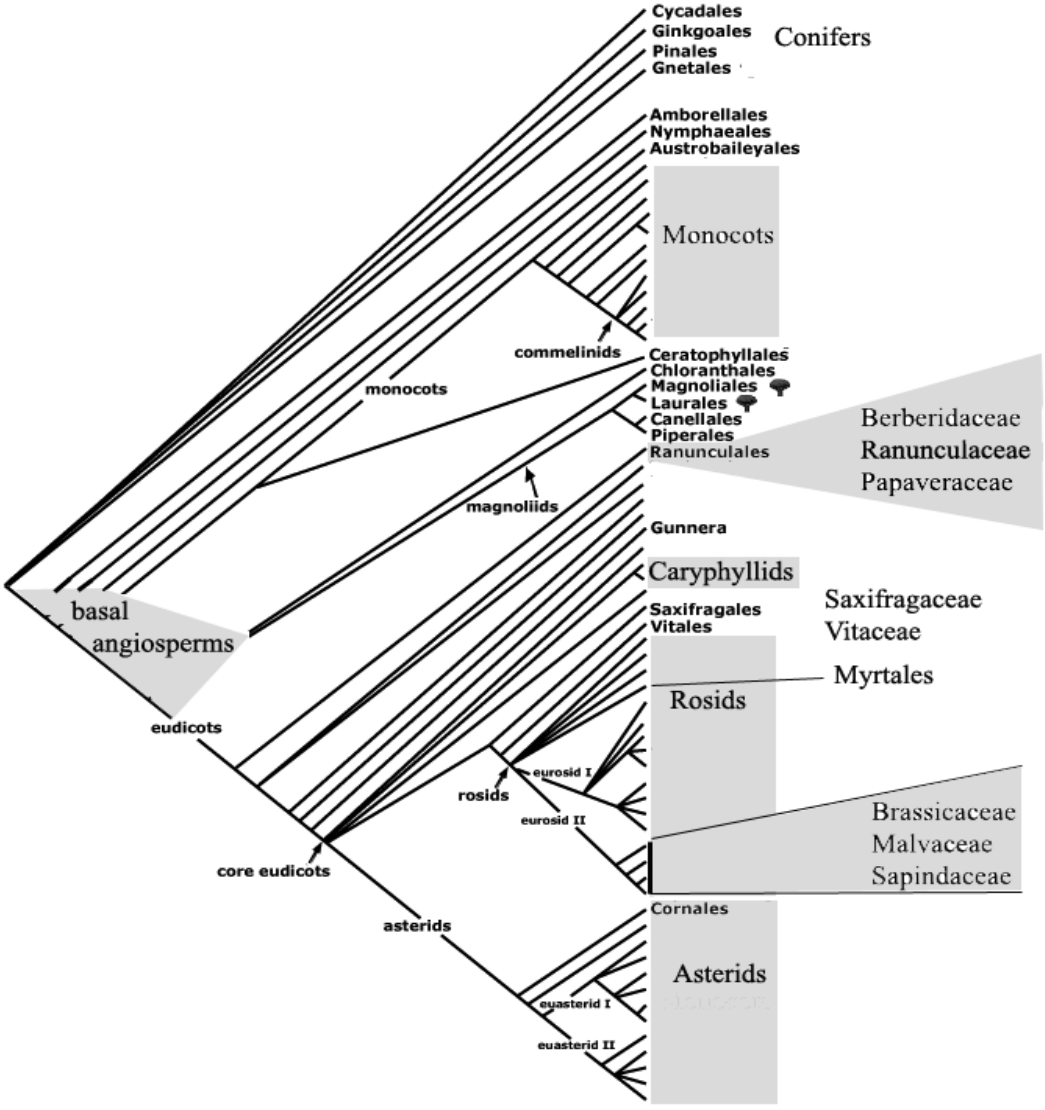
Basal Eudicot seeds and fruits

DQ Fuller 8.2.2006. Institute of Archaeology, UCL. MG101 Archaeobotany Practical

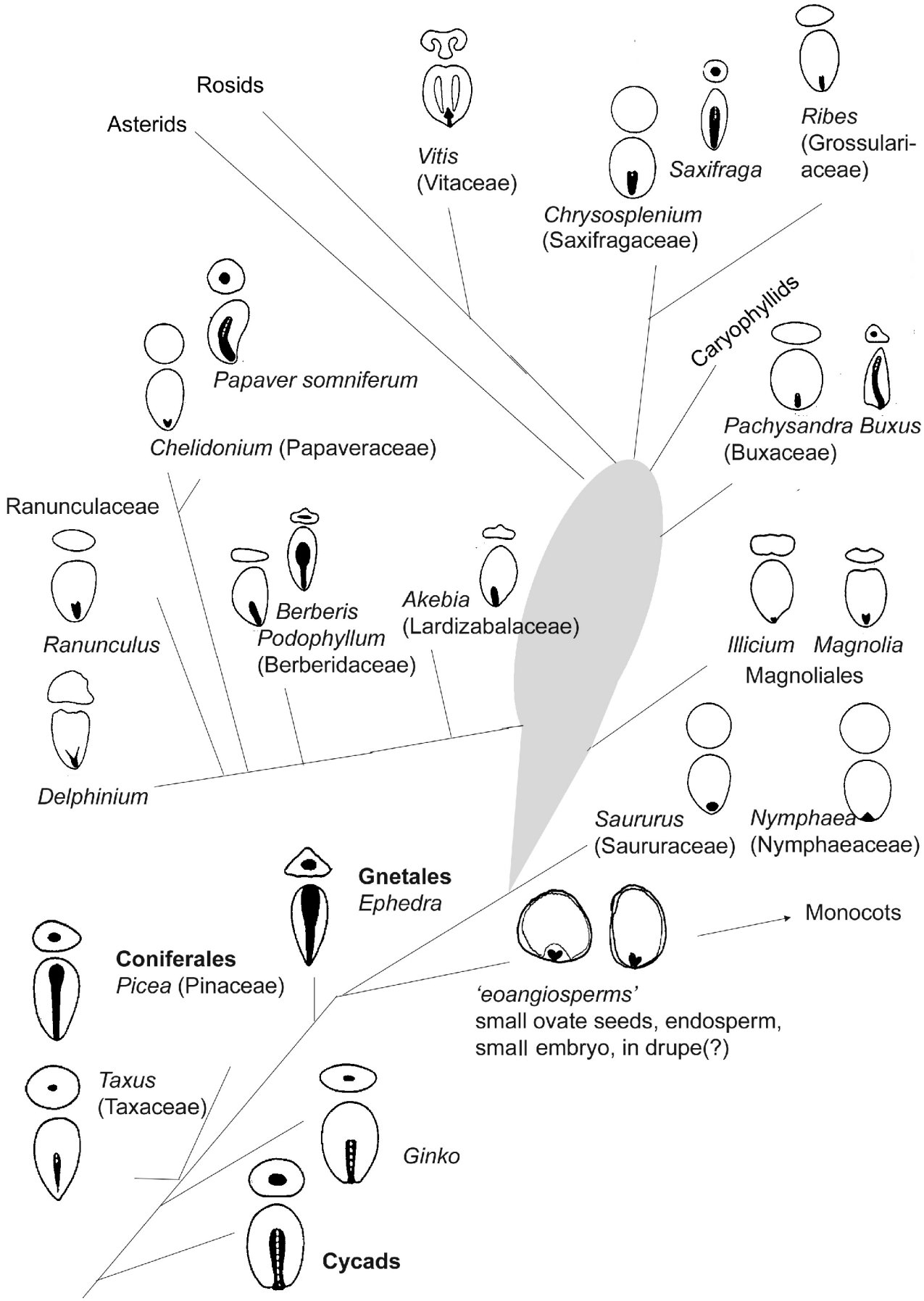
The **Eudicots** are an important phylogenetic grouping within flowering plants. Although they do not correspond to any traditional taxonomic class or subclass, they are been clearly defined by recent genetic-based phylogenies. Together with monocots the eudicots are the other large, well-defined and uncontroversial macro-clade within the flowering plant which evolved early from the poorly understood primitive angiosperms. They possess a few key morpholoigcal traits. Most important amongst them is tricolpate pollen which represents an advance of monosulcate pollen (of basal flower-plants, monocots and gymnosperms) and evolved about 120 million years ago; they also possess (initially) three-veined nodes. Flowers were originally dimerous (with two parts) but five and four part flowers have evolved numerous times.

In terms of large families that recur archaeologically, including a large number of weed species as well as a few crops, we will consider Ranunculales (Papvaraceae, Berberidaceae

Ranunculaceae), Saxifragaceae, Vitales (near the base of the traditional Rosid subclass) and important 'basal' Rosids (Myrtaceae, Brassicaceae, Sapindaceae)

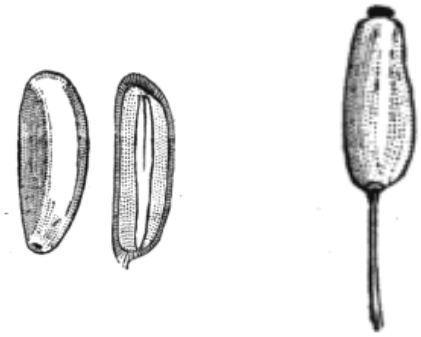


Phylogeny highlighting placement of selected groups. Based on ther Angiosperm Phyogeny website of Missouri Botanic Garden (http://www.mobot.org/MOBOT/research/APweb/welcome.html)


Rosids
Asterids
Vitis
(Vitaceae)
Saxifraga
Ribes
(Grossulari-
aceae)
Chrysosplenium
(Saxifragaceae)
Caryophyllids
Papaver somniferum
Chelidonium (Papaveraceae)
Pachysandra Buxus
(Buxaceae)
Ranunculaceae
Ranunculus
Berberis
Podophyllum
(Berberidaceae)
Akebia
(Lardizabalaceae)
Illicium
Magnolia
Magnoliales
Delphinium
Saururus
(Saururaceae)
Nymphaea
(Nymphaeaceae)
Gnetales
Ephedra
Monocots
Coniferales
Picea (Pinaceae)
'eoangiosperms'
small ovate seeds, endosperm,
small embryo, in drupe(?)
Taxus
(Taxaceae)
Ginko
Cycads

The Ranunculales include a group of more specialized 'primitive' angiosperms that has long been recognized, either as a distinct Ranunsulid subclass (Takhtajan) or else as a dervied branch of the Magnoliids (Cronquist). This group of plant is primitively herbaceous and it is amongst the large herbaceous families, such as Papaveraceae (poppies) with related Fumariaceae, Ranunculaceae (buttercups) and Berberidaceae (barberries, also with many woody species) that many agricultural weeds and early successional plants occur. The seeds in all this have much endosperm and relatively small embryos, and thus will appear largely 'hollow' when charred.

Berberidaceae produce fleshy berries (bacca) or sometime dry capsules usually will many fruits.



Berberis vulgaris, seed and fruit (images from http://delta-intkey.com/angio/www/berberid.htm).

Ranunculaceae have generally dry capsules in aggregates (i.e. Achenatum type fruits) but occasionally fleshy drupes in aggregate. Seeds are flattish and assymetric ovoid in shape usually with testa patterns. Only food plant is the spice black cumin (*Nigella satvia* L.), native of the eastern Mediterranean-- Turkey, Syria, North Iraq (Zohary and Hopf 2000: 206). Early finds include Tutankhamun's tomb (ca. 1325 BC) and Iron Age Jordan (Deir Alla). Also apparently in Assyrian written sources.

Nigella sp.

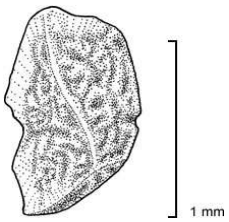
Aquilegia vulgaris [columbine]

Clematis achene (without tail)

Ranunculus acris (meadow buttercup) achene and seed.

Thalictrum flavum (common meadow rue), capsule cross-section and seed (pendant)

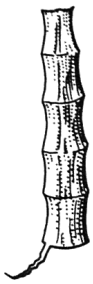
(above images from http://delta-intkey.com/angio/www/ranuncul.htm). Below: *Nigella arvensis,* Bronze Age Serbia/Montenegro (Helmut Kroll)



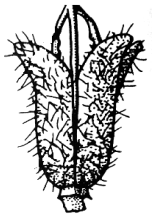
The Papaveraceae (poppy family) together with its subfamily Fumarioideae (sometimes considered a family) includes some 770 species worldwide including numerous weeds. Many species are poisonous. The only important culivar is *Papaver somniferum,* which produced edible oily seeds, from which opium also derived. It is a probable domesticated of the Western Mediterranean during the course of the Neolithic. The fruit is normally a many-seeded capsule, which may open through pores, valves or slits, while some linear groups of segments (bilomenutm)



Papaver rhoeas (field poppy) capsule and seed

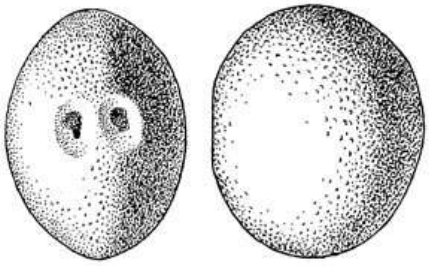


Hypecoum bilomentum type

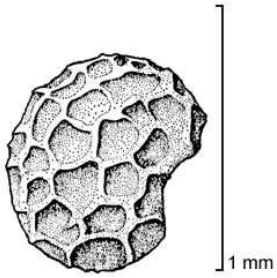


Argemone ceratium types (after Spjut 1994)

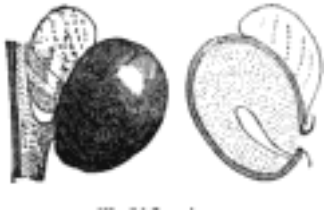
Chelidonium (Celadine)



Fumaria officinalis, Medieval Netherlands



Papaver somniferum, Iron Age Serbia

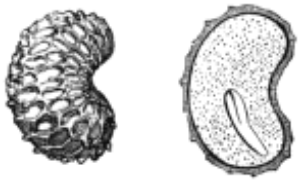


Chelidonium seed

(by Helmut Kroll, visit slideshow at http://www.archaeobotany.de/database.html)

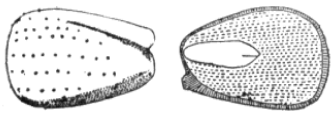
Glaucium flavum (yellow horned-poppy)

Meconopsis cambrica (Welsh poppy)



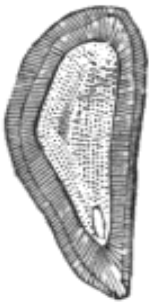
Roemeria hyrbida (Violet horned poppy)

Malvaceae segmented dehiscent fruits, typically of camarium type. The segments are usually arranged in a circle with the seeds forming radial segments. This family includes numerous important crops, including the cottons (both New and Old World indigenous varieties), vegetables like okra (Abelmoschus esculentus) and several bast fibres crops (especially in South Asia). Below a typical camarium fruit of *Abutilon* (after Spjut 1994).



Saxifraga (Saxifragaceae) seed.

Myrtus (Myratceae) seed.



Vitis seed, two different cross-sections.

In the Rosids, as evidence in Myrtaceae, embryos tend to lengthen and curl. These become recurrently folded and convolute in higher Rosid groups such as Malvaceae (e.g. Cotton) and Brassicaceae (various mustards). Please refer to earlier hand-outs on thes groups (e,g, oilseeds hand-out, Musil (1943) 'Disinguishing seeds of the Brassicaceae..' etc).