

Oenothera

Around 150 species, including:

- O. affinis
- O. acaulis
- O. albicaulis
- O. arequipensis
- O. argillicola
- O. bahia-blancae
- O. biennis
- O. brachycarpa
- O. caespitosa
- O. californica
- O. canescens
- O. catharinensis
- O. cavernae
- O. cinerea
- O. clelandii
- O. coloradensis
- O. coquimbensis
- O. coronopifolia
- O. curtiflora
- O. curtissii
- O. deltoides
- O. deltoides ssp. howellii
- O. drummondii
- O. elata
- O. elongata
- O. featherstonei
- O. flava
- O. fraserii
- O. fruticosa
- O. gaura
- O. glaucifolia
- O. glazioviana
- O. grandiflora
- O. grandis
- O. harringtonii
- O. hartwegii
- O. heterophylla
- O. hexandra
- O. howardii
- O. humifusa
- O. indecora
- O. jamesii
- O. laciniata
- O. lavandulifolia
- O. lindheimeri
- O. linifolia

O. longissima
O. longituba
O. macrocarpa
O. mendocinensis
O. mexicana
O. mollissima
O. montevidensis
O. nana
O. nutans
O. oakesiana
O. odorata
O. pallida
O. parodiana
O. parviflora
O. pedunculifolia
O. perennis
O. peruana
O. picensis
O. pilosella
O. primiveris
O. pubescens
O. punae
O. ravenii
O. rhombipetala
O. rosea
O. rubinervis
O. sandiana
O. santarii
O. scabra
O. serrulata
O. siambonensis
O. sinuosa
O. speciosa
O. stricta
O. stubbei
O. suffrutescens
O. tafiensis
O. tarijensis
O. tetraptera
O. triloba
O. tubicula
O. versicolor
O. villaricae
O. villosa
O. wolfii
O. xenogaura
O. xylocarpa

See: List of *Oenothera* species.

Oenothera is a genus of about 145[3] species of herbaceous flowering plants native to the

Americas.[4] It is the type genus of the family Onagraceae. Common names include evening primrose, suncups, and sundrops. They are not closely related to the true primroses (genus *Primula*).

The species vary in size from small alpine plants 10 centimeters tall, such as *O. acaulis* from Chile, to vigorous lowland species growing to 3 meters, such as *O. stubbei* from Mexico. The leaves form a basal rosette at ground level and spiral up to the flowering stems. The blades are dentate or deeply lobed (pinnatifid). The flowers of many species open in the evening, hence the name "evening primrose". They may open in under a minute. Most species have yellow flowers, but some have white, purple, pink, or red. Most native desert species are white. *Oenothera caespitosa*, a species of western North America, produces white flowers that turn pink with age.[5]

One of the most distinctive features of the flower is the stigma, which has four branches in an X shape.[6]

Oenothera flowers are pollinated by insects, such as moths and bees. Like many other members of the Onagraceae, however, the pollen grains are loosely held together by viscin threads, so only insects that are morphologically specialized to gather this pollen can effectively pollinate the flowers. Bees with typical scopa cannot hold it. Also, the flowers open at a time when most bee species are inactive, so the bees which visit *Oenothera* are generally vespertine temporal specialists: bees that forage in the evening. The seeds ripen from late summer to fall.

Oenothera are used as food plants by the larvae of some Lepidoptera species, including the large white-lined sphinx (*Hyles lineata*).[7] The flower moths *Schinia felicitata* and *S. florida* both feed exclusively on the genus, and the former is limited to *O. deltoides*.

In the wild, some species of evening primrose act as primary colonizers, quickly appearing in recently cleared areas. They germinate in disturbed soils, and can be found in habitat types such as dunes, roadsides, railway embankments, and waste areas. They are often casual and are eventually out competed by other species.

Based on observations of evening primroses (*O. drummondii*), a study discovered that within minutes of sensing the sound waves of nearby bee wings through flower petals, the concentration of the sugar in the plant's nectar was increased by an average of 20 percent. Experiments were also conducted on flowers with the petals removed. No change in nectar production was noted, indicating that it is indeed the flowers that have the job of the ears.[8]

The genus *Oenothera* may have originated in Mexico and Central America,[9][10] and spread farther north in North America and into South America. With the advent of international travel, species are now found in most temperate regions of the world. In Europe alone there are about 70 introduced species of *Oenothera*. [4] During the Pleistocene era a succession of ice ages swept down across North America, with intervening warm periods. This occurred four times, and the genus experienced four separate waves of colonization, each hybridizing with the survivors of previous waves.[10][11] This formed the present-day subsection *Euoenothera*. The group is genetically and morphologically diverse and the species are largely interfertile, so the species boundaries have been disputed amongst taxonomists.[9][12]

The pattern of repeated colonizations resulted in a unique genetic conformation in the *Euoenothera* whereby the chromosomes at meiosis can form circles rather than pairs. This is

the result of several reciprocal translocations between chromosomes such that the pairing occurs only at the tips. This phenomenon apparently has non-Mendelian genetic consequences; with this mode of chromosome segregation and a system of balanced-lethal genes, genetic recombination is prevented and the plants display the hybrid vigor of heterosis.[13] This resulted in the evolution of many sympatric races in North America east of the Rocky Mountains. Analysis of the cytology of these races and of artificial hybrids between them increased understanding of the genetic and geographic evolution of the *Eurothera*. This subject was a major area of genetic research during the first half of the 20th century.[14][15]

The appearance of sudden changes in *Oenothera lamarckiana* led the pioneering geneticist Hugo de Vries to propose what he called "mutation theory" in 1901 (*Mutationstheorie* in the German the original article was written in).[16] This asserted that speciation was driven by sudden large mutations able to produce new varieties in a single step. The understanding that the observed changes in hybrids of the plant were caused by chromosome duplications (polyploidy) rather than gene mutation did not come until much later.[17][18]

Evening primroses were originally assigned to the genus *Onagra*, which gave the family *Onagraceae* its name. *Onagra* '[food of] onager' was first used in botany in 1587, and in English in Philip Miller's 1754 *Gardeners Dictionary: Abridged*. The modern name *Oenothera* was published by Carolus Linnaeus in his *Systema Naturae*. Its etymology is uncertain, but it is believed to be derived from the Greek words *οἶνος* *θηρα* (*oinos therá*) 'wine seeker'.[19]

The genus is divided into 18 sections and additionally into several subsections and series.[1]

Certain *Oenothera* plants have edible parts. The roots of *O. biennis* are reportedly edible in young plants.[20]

The common evening primrose, *O. biennis*, is commonly sold as a dietary supplement in capsules containing the seed oil.[21] The main phytochemical in this evening primrose seed oil is gamma-linolenic acid.[21]

There is no high-quality scientific evidence that *O. biennis* or evening primrose oil has any effect on human diseases or promotion of health,[21][22] and specifically no evidence that it is effective to treat atopic dermatitis or cancer.[21][23] Research indicates that orally-administered evening primrose oil does not relieve symptoms of premenstrual syndrome,[24][25] and does not have an effect on shortening the length of pregnancy or labor.[26][27][28][29]

Consuming evening primrose oil may cause headache or stomach upset, may increase the risk of complications during pregnancy, and may increase the risk of bleeding in people given prescription drugs as anticoagulants, such as warfarin.[30]

A number of perennial members of the genus are commonly cultivated and used in landscaping in the southwestern United States. Popular species include tufted evening primrose (*Oenothera caespitosa*), Mexican evening primrose (*Oenothera berlandieri*), and Saltillo evening primrose (*Oenothera stubbei*).[31]

Annual evening primroses are also popular ornamental plants in gardens. Many are fairly drought-resistant.

The first plants to arrive in Europe reached Padua from Virginia in 1614 and were described by the English botanist John Goodyer in 1621. Some species are now also naturalized in parts of Europe and Asia, and can be grown as far north as 65°N in Finland. The UK National Council for the Conservation of Plants and Gardens, based at Wisley, maintains an *Oenothera* collection as part of its National Collections scheme.

Oenothera macrocarpa

Oenothera rosea

Oenothera caespitosa var. *marginata*

Oenothera stricta ssp. *stricta*

Oenothera sp. *opening*

Oenothera clelandii

Oenothera drummondii

Oenothera odorata

