

The background of the slide features two glass jars filled with dried herbs and oil. The jar in the foreground is filled with a yellowish-orange oil and contains dried, pressed plant material. The jar behind it is partially visible and contains a greenish oil. Both jars are sitting on a white, lattice-like surface. The text is overlaid on the right side of the image.

HERBAL ACTIVES

healing compounds in infused plant oils

discovering the plant compounds that heal

Lesson #1

plants for healing

Combining plants with plant oils, such as infusing or maceration, to transfer the plant's properties into the oil, is a time-honored tradition.

As old as civilization, and probably older, this means of medicine and healing is straight from nature and therefore complementary and compatible with our body's skin and functions.

We will examine the constituents in oils that migrate into the infused oil and how these can help treat a range of common problems while promoting overall health.

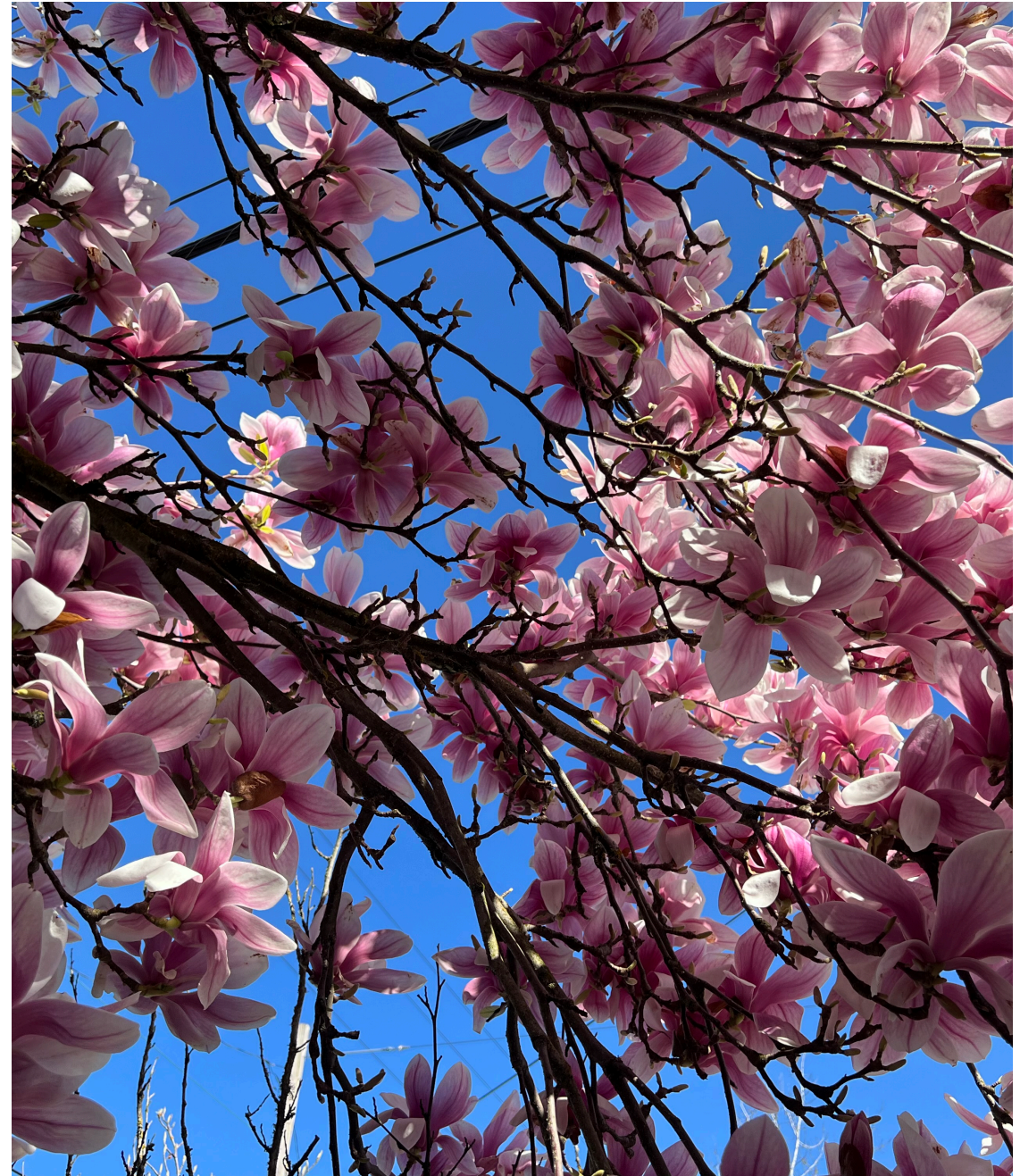


antioxidant and anti-inflammatory

The compounds for healing, whether herbal constituents or found in the unsaponifiable fraction of plant oils, serve two primary functions, in addition to other actions the skin and body require to maintain health.

Primarily, they have antioxidant properties protecting against damage from oxygen, and anti-inflammatory actions calming excessive response to harm or injury.

The consistency with which natural compounds either reduce harmful oxidation from the rigors of life or modulate inflammation from the onset of healing to its completion appears to be a gift of the plant world's compounds.



maintaining skin and body

In addition to being antioxidant and anti-inflammatory, there are numerous other actions the skin and body perform to maintain health.

These functions are complementary to the primary protections and include:

- Antioxidant protection, free radical scavenging

- Checking chronic inflammation

- Protection and repair from UV exposure

- Barrier support, repair, and hydration

- Wound healing and tissue regeneration

- Collagen and elastin support and repair

- Hormonal skin support

- Circulatory, vascular support

- Antimicrobial and antiviral protection and reduction



skin & lipid compounds

Oils we know do not penetrate past the stratum corneum of the epidermis, nor do we want them to!

Our skin's outermost layers serve as a barrier to protect the skin and body; it is called the skin barrier function for a reason.

So the oils, infused and otherwise, do not penetrate deeply.

Yet they activate the many functions that protect and regenerate collagen or elastin, repair damage from UV rays, and perform other functions.

They don't physically penetrate, yet they activate various functions by signaling molecules and adaptive communication functions to orchestrate the necessary actions for our health.

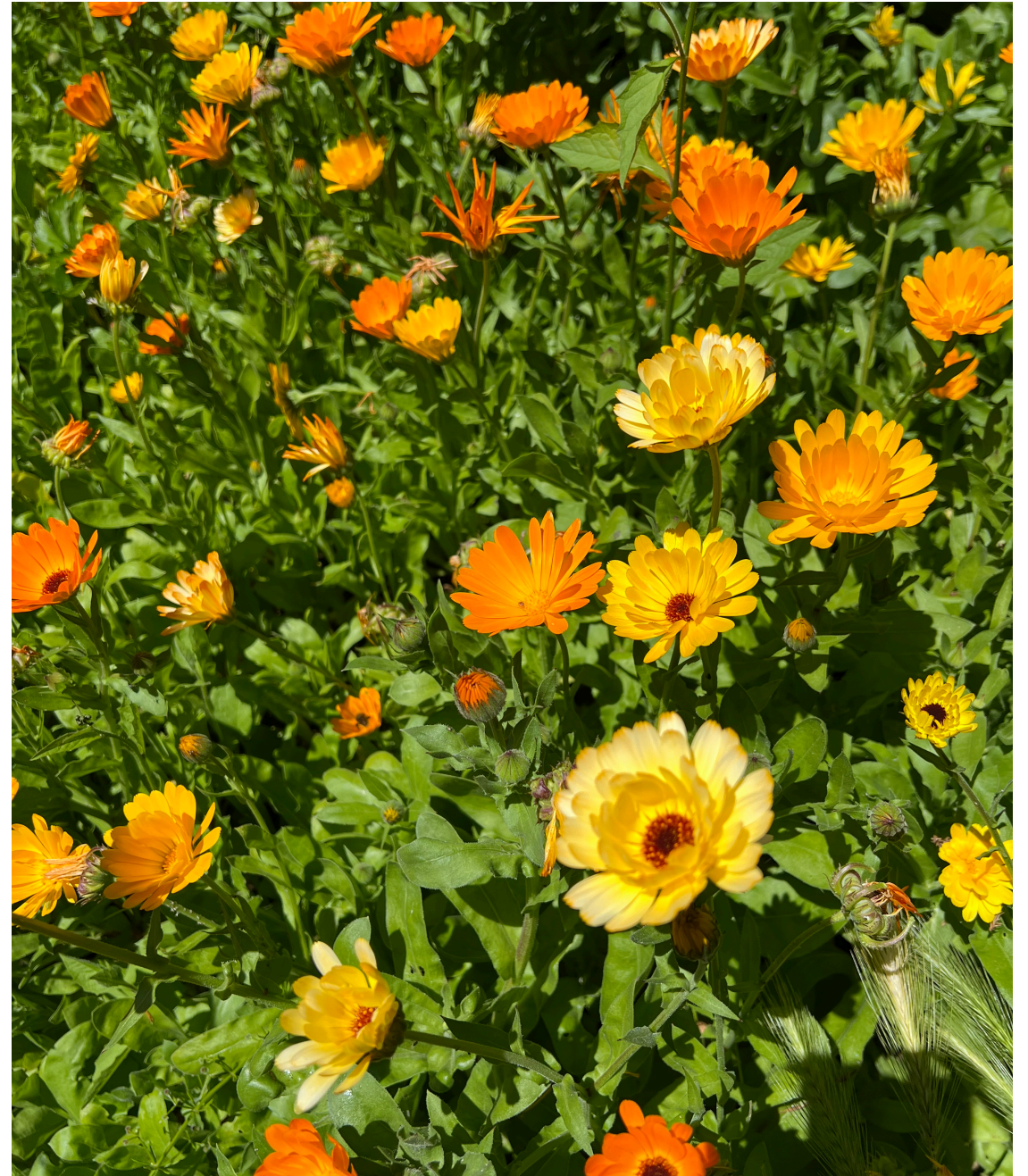


active, and signaling

Within this framework of protection from excessive oxygen and modulation of inflammation, as well as the further upkeep of body systems, lie a tremendous number of adaptive, signaling, and orchestrating mechanisms that lead to a well-balanced and healthy skin and body.

The active compounds in plants that help and heal fall into groups, which, when understood, will help us better comprehend how the compounds function and how they are related to each other.

This is the language of the healing fraction of plants, a language worth getting to know.



terpenes & polyphenols

There are two major classes of compounds that provide the actions we utilize from the plant world.

The first category is terpenes and terpenoids, which exhibit antiviral, antimicrobial, anticancer, antiseptic, astringent, digestive, and diuretic properties.

In addition, they are primarily oil-soluble compounds and so migrate into infused oils readily.

The second group is the polyphenols, which include flavonoids and phenolic acids, again with broad actions that help regulate healing in the body.

Polyphenols, however, are broadly water-soluble.

Both groups provide nature with color and vibrancy that can help us appreciate the healing power of nature through its hues and tints.



solubility; oil or water

As we undertake the task of identifying compounds that infuse into oil, we need to consider the solubility of these compounds, specifically whether they are oil-soluble or water-soluble.

With a few exceptions, the terpene/terpenoid group of compounds is readily soluble in oil, moving easily from plant tissues to the infusing oil.

The polyphenols, flavonoids, and phenolic acids, however, are more often water-soluble compounds and so require assistance to migrate into the infusing oil.

In addition to these major groups, there are additional plant compounds that contribute to the healing power of plants, which we'll cover individually. These can be oil or water-soluble.



terpenes, terpenoids

Terpenes and terpenoids are illustrated in a simplified chart in the next slide, showing the relationships between the smaller volatile compounds that comprise essential oils and the larger non-volatile compounds found in plants and plant oils.

The lessons on terpenes introduces the isoprenoid unit that forms the basis of all of the compounds, both volatile and material, along with the actions of each major group.

The terpene group of compounds consists of multiples of this single isoprene unit, which is a 5-carbon compound with eight hydrogen atoms, C_5H_8 .



Terpenes & Terpenoids

- ✓ Both terpenes (CH) and terpenoids (CH+O₂) are present in ALL parts of the plant.
- ✓ Built from repeating isoprene units consisting of five hydrocarbons (C₅H₈).
- ✓ Terpenes are highly aromatic, the smaller volatile ones making up the essential oils while larger ones are found in the fixed oils.

Small volatile compounds:

Isoprene unit	1 isoprene unit	5 carbon atoms	basic unit 5C - (C ₅ H ₈)
Monoterpenes	2 isoprene unit	10 carbon atoms	essential oils, thymoquinone
Sesquiterpenes	3 isoprene unit	15 carbon atoms	essential oils

Heavier larger compounds:

Diterpenes	4 isoprene units	20 carbon atoms	resins, Vitamin A retinoids, lipids
Triterpenes	6 isoprene units	30 carbon atoms	squalene, Ursolic acid phytosterols stigmasterol
Tetraterpenoid	8 isoprene units	40 carbon atoms	Carotenoids vitamins, pro-vitamin A

This is an early simplified version of this chart but shows the fundamental relationships between these compounds

The polyphenols are a large family of phytochemicals, characterized by multiple phenols, which are aromatic rings with a hydroxyl group.

They are broadly antioxidant, anti-inflammatory, and modulate biological signaling, all of which are important for maintaining and healing the skin and body.

There are four classes of polyphenols:

Flavonoids and Phenolic acids,
Lignans and Stilbenes

Each of these four classes contains thousands of variations and their associated actions, making it a complex task.

We will focus on the first two, the Flavonoids and the Phenolic acids commonly found in plant tissues.

polyphenols



not so simple

While many of the healing compounds found in plants fall into the terpene/isoprenoid or the polyphenol groups, nature is far more complex than to make either-or, the only choices.

Chlorophyll, for example, found in all plants with the color green, falls outside of these two dominant groups, as do the two dominant compounds in St. John's wort, hypericum and hyperforin.

Some compounds we need to isolate

However, being able to group the many triterpenes, flavonoids, and phenolic acids is helpful to me, and so I am sharing the plant's healing compounds in that manner.



a vast subject

The terpene/terpenoid group versus the polyphenols and the broader range of natural compounds that make up the botanical world is vast.

The complexity of this subject only expands, and finding broad patterns to hold onto is my aim.

Each of these broad groups, terpenes and polyphenols, has a lesson devoted to its major structures and functions.

Plus a lesson to examine important compounds that fall outside of the two main groups.

While these groups comprise thousands of named compounds, we will look at the most common, which are present in many of our herbal friends.



lipo- and hydro-

The solubility in oil or water-based compounds can be one place to anchor our understanding of what will infuse and what needs additional help to migrate into the maceration oil.

Language can help us identify the properties, especially concerning solubility in oil or water.

Oil-soluble is identified by the terms:

Lipophilic

Hydrophobic

While water-receptive compounds are described as:

Hydrophilic

Lipophobic



herbal healing

The actions and compounds involved in the process of healing are present in the botanical realm.

By understanding what is possible by employing the various plants and plant compounds, we can help to maintain our health throughout our lives.

There are many overlapping compounds in plants, such as chlorophyll, found in all green plants. Carotenoids are also present in most plants in various ways and contribute color and antioxidant protection.

The compounds involved in herbal healing is a large and significant subject! Let's see if we can seize the opportunity and use it to our advantage.



