

Chapter 11

Botanical Alchemy: Ancient Remedies in Modern Healing

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ABSTRACT

Plants have always been essential to the health and welfare of humans. Botanical knowledge has shaped our concept of healing from the oldest civilizations to current medicine through the decades. Recently, there has been a revival of interest in botanical alchemy, the ancient practice of using plants' therapeutic potential, as people look for more natural and holistic health care methods. Botanical alchemy is based on the idea that plants have natural therapeutic properties that may be extracted and used for a variety of medical conditions. Strong medicines were made from plant materials by ancient healers using a range of methods, including fermentation, distillation, and extraction. Skin illnesses, respiratory infections, and digestive problems were among the many ailments for which these medicines were often used to cure. Many of the traditional applications of herbal treatments have been confirmed by current scientific investigations. According to these studies, several plants have active ingredients that have antioxidant, antiviral, and antibacterial qualities. Because it provides natural alternatives to traditional therapies, botanical alchemy has grown in importance as a tool for integrative and complementary medicine. Plant alchemy has remained to be a popular method that has recently gained a resurgence as a useful instrument for complementary medicine. Botanical alchemy is a comprehensive approach to treat a wide range of illnesses by exploiting the therapeutic qualities of plants.

KEYWORDS

Remedies, Plants, Botanical alchemy

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INTRODUCTION

People have been using different plants and their various parts as medicine for thousands of years. Throughout history, people have employed plant-based ingredients, such as food portions or botanical portions and powders, to treat and prevent illness, with differing degrees of effectiveness. Archeological evidence points to even older usage of medicinal herbs, and written records about them go back at least 5000 years to the Sumerians (Pan et al., 2014). When Friedrich Bayer and Co. brought the synthetic acetyl salicylic acid (aspirin) to the human use in 1897, the long-standing, close relationship between plants and human health started to break down. Salicylic acid, the active component of willow bark, has a safer synthetic equivalent in aspirin, which was separately discovered by people in the old and new world as a treatment for fever and pain (Raskin et al., 2002). In a more traditional sense, Herbal Medicine (HM) refers to the use of plants, plant parts, their water or solvent extracts, essential oils, gums, resins, exudates, or other form of advanced products made from plant parts, therapeutically to provide proactive support of various physiological systems (Al-Attar and Shawush, 2014). According to the World Health Organization (WHO), non-conventional medicine is used for primary healthcare by over 70-80% of the world's population, especially in poor nations (Bordogna, 2011).

The use of these chemicals is not usually permitted by regulatory bodies that oversee safety and efficacy protocols, and several published studies highlight the poor quality of phytomedicinal product manufacturing, distribution, and prescription practices. Approximately 25% of medications prescribed globally are derived from plants, with 121 active plant chemicals currently in use. Of the 252 medicines from the WHO lists as basic and necessary, just 11% from it are derived solely from plants, and a significant portion are synthetic medications made from natural precursors. Digoxin from *Digitalis* spp. quinine and quinidine from *Cinchona* spp., vincristine and vinblastine from *Catharanthus roseus*, atropine from *Atropa belladonna*, and morphine and codeine from Papaver and somniferum are a few examples of significant medications derived from plants (Rates, 2001). Indian subcontinent has a rich, colorful, and varied cultural past. The concept of health and healing is important to this culture and heritage. As a result, all ethnic groups across the various ecosystems have access to a vast area of information about health and healing. Unfortunately, for the last

several centuries, mainstream culture has had a greater effect on this body of knowledge, diluting the importance of regional health customs. To preserve local health customs, it is critical to quickly implement efficient recording and evaluation systems; otherwise, this magnificent people's health culture would be gone forever (Agrawal et al., 2006). Indian region is popular as "botanical garden of the world" as it is perhaps the world's biggest grower of therapeutic plants. More than 3000 plants are officially recognized as having therapeutic use in India. Around 6000 plants are thought to be used in traditional, folk, and HM in India; this amount is thought to cover around 75% of the third world nations' medical requirements (Rajasekharan and Ganeshan, 2002). Over 7800 pharmaceutical production facilities are thought to exist in Indian region, and these facilities are thought to use roughly 2000 tons of herbs in a year (Ramakrishnappa, 2003). India is home to three of the ten herbal medications that are most often sold in developed nations: *Allium sativum*, *Aloe arbedensis*, and *Panax* sp. formulations. Approximately 7000 medicine companies, either with or without standardization, produce traditional medicines (Dubey et al., 2004).

In a world where the conversation about healing is often dominated by contemporary medicine, there is a deep respect for the age-old knowledge found in the field of botanical alchemy. Ever since the beginning of human history, people have had a close connection with plants because they have realized how profoundly they can heal illnesses and promote life. Botanical alchemy, which is based on the fusion of THM and spirituality, is evidence of humanity's continuous pursuit of overall health (Balick and Cox, 2020). Botanical alchemy reveals an array of treatments, customs, and ceremonies that have withstood the test of time by drawing on the knowledge of civilizations that span continents and eras. Through experimentation, intuition, and investigation, people were able to determine the therapeutic qualities of plants. These traditional healers discovered the powerful properties of plants and used them to treat the body, the mind, and the spirit (Hoffmann, 2003). Botanical alchemy became a fundamental aspect of human health via the precise formulations of Ayurveda, the complex plant wisdom of European folk traditions, or the shamanic activities of indigenous civilizations (Frawley and Lad, 1994). Botanical alchemy remains popular in today's healthcare environment, appealing to those who are looking for holistic therapy and natural solutions. Ancient knowledge finds echo in contemporary study as scientists dive further into the molecular complexity of plant medicine, verifying the effectiveness of botanical medicines for a wide range of maladies. The therapeutic capacity of plants crosses cultural barriers, providing a gentle but deep route toward balance and repair. Examples of these traits include the relaxing benefits of chamomile and the effective anti-inflammatory capabilities of turmeric (Nunez, 2024).

HM is the study of pharmacognosy, and the holistic concepts of conventional treatment systems are all included in the multidisciplinary field of botanical alchemy. Utilizing the accumulated knowledge of various cultures and historical eras, it centers on the investigation and application of plants for medicinal purposes. Recognizing the significant influence of botanical treatments on general well-being, this holistic approach to healing emphasizes the interdependence of mind, body, and spirit. Botanical alchemy has its origins in the cultivation of plants for their symbolic and medicinal qualities in ancient civilizations including Egypt, Mesopotamia, China, and India. The herbal lore and therapeutic techniques of these ancient societies can be understood through literature such as the Indian Ayurvedic scriptures and the Egyptian Ebers Papyrus. Dioscorides and Hippocrates' writings, which represent the Greek herbal traditions, add much more botanical information to the library of knowledge (Barnes, 2001; Šavikin et al., 2013).

Different parts of different plants in different forms such as pills, capsules, gel, cream and oils are used to cure different diseases and heal. For example, Alo vera leaves have acemannan, arctigenin, ankit, arctiin, etc active ingredients used as anticancer, antiviral, antidiabetic, and anti-inflammatory (Sun et al., 2014). *Caesalpinia sappan* has brazilin and sappanchalcone in its roots that act as active ingredients as anti-allergic, antibacterial, anti-inflammatory, and viral neuraminidase inhibitors. It is used for edema, pain treatment and improvement of blood circulation (Zhao et al., 2014). *Rhodiola imbricate* has active ingredients in rhizomes used as anti-cancer, anti-oxidative, immunomodulatory agent (Senthilkumar et al., 2014).

The evolution of botany alchemy was significantly influenced by alchemy as it was conducted in medieval Europe. In addition to investigating the therapeutic qualities of plants and minerals, alchemists aimed to transform base metals into gold, establishing the foundation for contemporary pharmacology. Alchemical and herbal knowledge were combined by experts like Nicholas Culpeper, the author of the seminal herbal treatise "The Complete Herbal," and Paracelsus, with his "The Doctrine of Signatures." Using both sophisticated scientific techniques and age-old knowledge, botanical alchemy is still evolving in the current era. Native Americans have a rich history of using plants in their medicinal practices. This has been documented by ethnobotanists such as Wade Davis and Richard Evans Schultes, who have brought attention to the cultural importance of plants. Pharmaceutical pharmacology, the scientific study of natural products derived from plants and other living things, sheds light on the pharmacological characteristics and mode of action of herbal treatments (Kumar and Kumar, 2009). An all-encompassing approach to health, traditional Chinese medicine (TCM) has been practiced for thousands of years. It places a special focus on herbal compositions and energy concepts. To bring the body's equilibrium and harmony back, Ayurveda, an age-old Indian medical tradition, uses herbal and botanical concoctions. As a reflection of the close bond that exists between indigenous peoples and their natural surroundings, traditional healing traditions from Africa, the Americas, and Oceania also make use of locally accessible plants for medicinal and spiritual purposes. More overtrade and migration have made it easier for people to share plant knowledge across borders, which has enhanced cultural plant repertoires and promoted the blending of traditional medical practices (Šavikin et al., 2013). Several different

industries employ Herbal Medicinal Products (HMPs). These are globally significant, fast-expanding, interdisciplinary industries that fall into several categories as shown in Fig. 1.

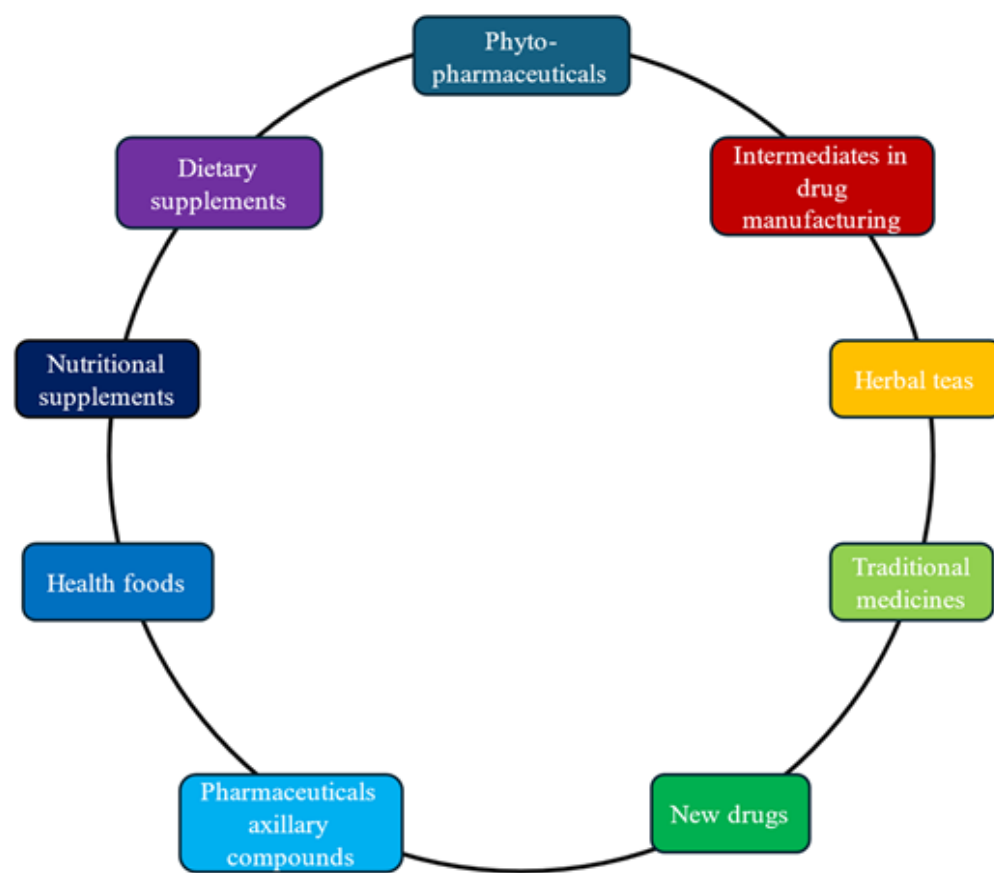


Fig. 1: Industrial use of HMPs

2. Historical Context of Herbalism and Traditional Medicine

The WHO reported almost 30 years earlier that in several nations, traditional practitioners and birth attendants care for 80% or more of the residents living in rural areas (Bannerman et al., 1983; Kayne, 2009). According to recent and realistic updates "traditional medicine is utilized frequently by the majority of the population in most developing countries" (WHO, 2008). Towards understanding the role of traditional medicine in modern era, following information need attention.

- In poor nations, the majority of people practice traditional medicine, while very few regularly have access to reliable contemporary medical care (Bodeker, 2001).
- Between 30 and 50 % of all medications used in China are made from traditional herbal medicine (THM) (Kayne, 2009).
- The Mexican government is constructing regional health facilities, which will be occupied by traditional healers who will also be trained in illness detection. Traditional midwives (parteras), herbalists (herbalistas), bone-setters (hueseros), and spiritual healers (curanderos or prayers) are among the practitioners (Kayne, 2009).
- Using herbal remedies at home is the first line of therapy for 60% of children in Ghana, Mali, Nigeria, and Zambia who have a high fever due to by malarial parasite infection (Kayne, 2009).
- Using knowledge that extends back as far as 1000 BC, an estimated 250,000 traditional healers in South Africa provide treatment to almost 80% of the black population (Edinburg, 1998; Kayne, 2009).

According to WHO estimates, traditional birth attendants help with most deliveries in some African nations. Traditional medicine is used in some Latin American, Asian, and African nations to deal with basic healthcare requirements. Up to 80% of people in Africa get their primary care from traditional medicine practitioners. More than one-third of people living in underdeveloped nations do not have access to basic medications (Kayne, 2009).

The consumption of botanical material for medical reasons, including entire plants, roots, bark, leaves, flowers, berries, or seeds, is referred to as THM, or "phytomedicine" (Organization, 2005). Archaeological evidence indicating human usage of HM going back to the Neanderthal era has long history of HM utilization outside of traditional medicine. Pollen from modern HMs, such as yarrow (*Achillea millefolium* L., Asteraceae), chamomile (*Matricaria recutita* L., Asteraceae), centaury (*Centaureum erythraea* Rafn., Gentianaceae), mallow species (Malvaceae), and ephedra species (Ephedraceae), has been found during dug-outs at Neanderthal sites (65,000 years old) at the Shanidar Caves in northern Iraq (Solecki, 1971). This finding suggests that these plants were used in ancient rituals or for medicinal use Hardy et al. (2012) discovered traces of yarrow and chamomile on the molars of five Neanderthal individuals from the El Sidrón site in northern Spain, which dates around 50,000 years ago (Hardy et al., 2012). Leach et al. (1996) reported a noteworthy discovery in Texas, whereby plant pollen of yarrow and chamomile were found alongside ephedra and

coltsfoot (Leach et al., 1996). According to Applequist and Moerman, (2011) yarrow is well known for its ability to treat a wide range of ailments, and these varieties continue to be utilized in HM by many nations (Applequist and Moerman, 2011).

Throughout history, HM has been widely used on a worldwide scale. In Mesopotamia, Asia, Africa, the Americas, and Australasia, pre-Christian periods laid the groundwork for significant modern HM systems. For instance, many of the significant botanical remedies used in Ayurvedic treatment have their roots in the Rig-Veda, a compilation of holy Hindi scriptures that dates back thousands of years (Saboo et al., 2014). Written records of the use of herbal remedies by Shan Hai Jing or Shi Jing date back to around 1000–500 B.C. in Chinese Herbal Medicine (CHM) (Pan et al., 2014).

Wintergreen which includes salicin, a painkiller that Hippocrates, around 400 B.C., recorded his observation as "willow leaf brew eases the pain of childbirth" (Walker et al., 2018). Sources of some common HM present in the world are given in Table 1. In contrast to Europe, the use of HM did not become less common in Asia throughout the first century A.D. In actuality, the Chinese Manual of Materia Medica (Shennong Ben Cao Jing), which describes over 252 HMs, was produced in the first century A.D. during the Han Dynasty in TCM (Yang, 1998). Compendium of Materia Medica (Ben Cao Gang Mu), a later book created during the Ming Dynasty (1368–1644), is regarded as one of the most important Materia Medica ever documented. It was put together over 27 years ago by Li Shizhen, who was also a pharmacologist and herbalist. 12,000 plants and herbal remedies were included in this compendium (Hoizey and Hoizey, 1993; Selin, 2013). China's medical industry flourished throughout the Ming Dynasty (1368–1644), and medicinal exchanges occurred between China, Korea, Japan, and even Europe (Hinrichs and Barnes, 2013).

Table 1: Sources of some common HM (Lubbe and Verpoorte, 2011).

Product	Botanical Name	Wild/cultivated	Origin
Asian ginseng root	<i>Panax ginseng</i>	Cultivated	China
American ginseng root	<i>Panax quinquefolius</i>	Wild	USA
Buchu leaf	<i>Agathosma betulina</i>	Cultivated	South Africa
American ginseng root	<i>Panax quinquefolius</i>	Cultivated	USA (Wisconsin) Minnesota. Canada
Saffron style and stigma	<i>Crocus sativa</i>	Cultivated	Kashmir
Shatavari root	<i>Asparagus racemosus</i>	Wild/cultivated	India
Goldenseal rhizome	<i>Hydrastis canadensis</i>	Wild	USA
Costus root	<i>Saussurea costus</i>	Wild	India
Bilberry fruit	<i>Vaccinium myrtillus</i>	Wild	Bosnia Herzegovina, Croatia, Poland
Andrographis herb	<i>Andrographis paniculata</i>	Wild/cultivated	India
Schisandra fruit	<i>Schisandra chinensis</i>	Wild	China (North)
Goldenseal rhizome	<i>Hydrastis canadensis</i>	Cultivated	Wisconsin
Narrow-leaved coneflower root (Echinacea)	<i>Echinacea angustifolia</i>	Wild/cultivated	USA

Prehistoric periods on the subcontinent are where the application of HM in Indian Ayurvedic treatment began (Svoboda, 1992). In India, Ayurveda thrived during the Middle Ages, and during this time, several significant medicinal texts were created, most notably by Sushruta and Charaka. The Charaka Samhita was created by Acharya Charak. This was essentially a pharmacopeia, which is still important in Ayurvedic treatment. More than 100,000 plants and plant derivatives are listed, along with their characteristics and uses (Manojkumar, 2013; Sendker and Sheridan, 2017). While the use of HM by humans has expanded throughout time, it's important to remember that other primates, including chimpanzees (*Pan troglodytes*), also utilize medicinal plants as a kind of self-medication for illnesses and diseases (Huffman, 2003). It has also been shown that birds use the insecticidal properties of plants like Nicotiana to lessen the amount of ectoparasites they eat (Suárez-Rodríguez et al., 2013).

Numerous traditional and age-old herbal remedies have produced significant contemporary medicinal substances whose main bioactive components have been identified and defined. These include drugs like aspirin, whose precursor, salicin, is produced from willow (*Salix* species) and was first used more than 2,000 years ago as an analgesic (Smith et al., 2014). After aspirin was originally synthesized 110 years ago, Bayer registered its trademark under the Berlin Imperial Office in 1899. Vinblastine, vincristine, vindesine, and vinorelbine are examples of current anti-mitotic and anti-microtubule vinca alkaloids that are developed from the *Catharanthus roseus* (L.) G. Don (Apocynaceae) periwinkle plant found in Madagascar (Moudi et al., 2013). Asia, Africa, and Central America have traditionally used this plant as a traditional medicine to treat diabetes (Ong et al., 2011; Patel et al., 2012). It has historically been used topically to treat malaria and diabetes in CHM, as well as wasp stings in Ayurvedic medicine (Nejat et al., 2015). Among the Amaryllidaceae, snowdrops (*Galanthus elwesii* Hook and *Galanthus woronowii* Losinsk) are an intriguing example of a medicinal chemical discovered via traditional medicine. They create galanthamine, a cholinesterase inhibitor that is being utilized in clinical settings to treat Alzheimer's disease and mild to severe vascular dementia (Olin and Schneider, 2002).

Evidence-Based Medicine

HMs are becoming more and more popular, and they may be added to preventive medications and healthy diets. Furthermore, according to Chauhan et al. (2013) and Wachtel-Galor and Benzie (2012), they are becoming more and more prevalent in functional foods, nutraceuticals, and natural health products (Chauhan et al., 2013; Wachtel-Galor and Benzie,

2012). They may be made into pills, capsules, teas, tinctures, lotions, oils, and liquids, among many other forms of processing and formulation. The need for unprocessed medicinal plants and their mixtures is a significant and expanding global market (Chauhan et al., 2013).

Alo vera

5000 years ago alo vera and its products are used by Romans, Egyptians, and Indigenous peoples of Africa, America, and Asia for the treatment of ulcers, burns, and surgical wounds (Garcia-Orue et al., 2017). Some natural bioactive compounds such as oleic acid, phytol, glycosides, pyrocatechol, acemannan, and saponins are present in aloe vera (Salehi et al., 2018). It has better antimicrobial effects on Gram-positive bacteria as compared to Gram-negative bacteria (Lawrence et al., 2009). Acemannan, saponins, and anthraquinone have known antimicrobial activities (Martínez-Romero et al., 2006). Aloe vera's main mucopolysaccharide, or mesoglycan, acemannan, is a strong macrophage and T-cell activator that also triggers the transcription of proinflammatory mRNAs, such as IL-1 α , IL-1 β , IL-6, TNF- α , PGE2, and nitrous oxide (Ali et al., 2014).

Arctium lappa

Burdock, or *Arctium lappa*, is a perennial plant that is extensively grown (Lin et al., 2002). In North America, Europe, and Asia, *arctium lappa* is utilized for treating skin diseases such as acne, rashes, and boils as well as sore throats (Chan et al., 2011). Research findings indicate that *Arctium lappa* has many beneficial qualities, including anti-inflammatory (De Almeida et al., 2013), antidiabetic (Ahangarpour et al., 2017), antibacterial (Pereira et al., 2005), antiviral (Dias et al., 2017), anticancer (Sun et al., 2014), and hepatoprotective (de Souza Predes et al., 2014). *Arctium lappa* root extract has been demonstrated to dramatically enhance dermal extracellular matrix metabolism, impacting glycosaminoglycan turnover and mitigating wrinkle appearance in human skin *in vivo* (Knott et al., 2008). Additionally, it has been observed that *Arctium lappa* controls gene expression and cell adhesion in canine dermal fibroblasts, influencing the Wnt/ β -catenin signaling pathway a crucial regulator of wound healing (Pomari et al., 2013).

Ampelopsis japonica

Ampelopsis japonica is a plant that grows in eastern Asia and eastern North America. Among its traditional uses are for the healing of burns and ulcers (Mi et al., 2014). *Ampelopsis japonica* has been shown to exhibit a variety of pharmacological properties, such as neuroprotective (Park et al., 2013), antibacterial, and anticancer properties (Nho et al., 2015). Rats cutaneous scald injuries healed more quickly when exposed to ethanol extracts made from the desiccated roots of *Ampelopsis japonica*, as shown by Lee (Lee et al., 2015). Topical therapy with ethanolic *Ampelopsis japonica* increased reepithelization, granulation tissue development, vascularization, and collagen deposition when compared to wounds administered Vaseline® (petroleum jelly) or silver sulfadiazine (Lee et al., 2015).

Andrographis paniculata

In China, India, and other south-east Asian nations, *Andrographis paniculata*, often called green chiretta, is employed as a traditional remedy for fever, snake bites, diarrhea, infections, wounds, and itching (Chen et al., 2014). Antioxidant (Adedapo et al., 2015), anti-inflammatory (Shen et al., 2013), antidiabetic (Akhtar et al., 2016), anticancer (Kumar et al., 2004), antimicrobial (Rahman et al., 2014), antiviral (Wiert et al., 2005), antimalarial (Mishra et al., 2011), hypotensive (Zhang and Tan, 1996), immunostimulatory (Kumar et al., 2004), and hepatoprotective (Nagalekshmi et al., 2011) properties are shown by extracts derived from *Andrographis paniculata*. In a particular investigation, it was shown that administering a 10% aqueous leaf extract of *Andrographis paniculata* to rats greatly improved their ability to heal wounds (Al-Bayaty et al., 2012). In healed wounds, animals treated with *Andrographis paniculata* showed decreased inflammation, decreased scarring, enhanced angiogenesis, and an increase in collagen fibers. Clinical investigations have officially studied and demonstrated the critical benefits of andrographolide, a bicyclic diterpenoid derived from the leaves of *Andrographis paniculata*, on a number of autoimmune illnesses (Al-Bayaty et al., 2012).

Caesalpinia sappan

In TCM, the heartwood of *Caesalpinia sappan* is used to minimize discomfort and oedema, enhance blood circulation, and serve as a well-known dye (Zhao et al., 2014). The homosoflavonoids that were extracted from *Caesalpinia sappan* have been shown to exhibit antiallergic (Yodsaoue et al., 2009), anti-inflammatory (Min et al., 2012), and inhibitory effects on viral neuraminidase activity (Jeong et al., 2012). Ethanol preparations of *Caesalpinia sappan* have been shown to have potent antibacterial action against these pathogens *Acinetobacter baumannii*, *Pseudomonas aeruginosa*, *Klebsiella pneumoniae*, *Escherichia coli*, and MRSA (Temrangsee et al., 2011). It is surprising to learn that *Caesalpinia sappan*'s ethanol root extract also promotes dermal fibroblast migration, proliferation, and collagen production (Tewtrakul et al., 2015), all of which help the skin repair wounds.

Calendula officinalis

Calendula officinalis, sometimes referred to as pot marigold, is a widely distributed herb that is used to heal burns, wounds, and dermatitis, among other skin diseases (Nicolaus et al., 2017). *Calendula officinalis* is credited with a variety of

pharmacological properties, such as anti-inflammatory, antioxidant, antibacterial, antiviral, antifungal, and anticancer properties (Chandran and Kuttan, 2008). Nevertheless, the precise processes behind its effects on wound healing are still understood. *Calendula officinalis* extracts have been shown through experiments via cultures of human and murine fibroblasts to promote fibroblast migration and proliferation in a PI3K-dependent manner (Dinda et al., 2015). By modifying the production of connective tissue growth factor (CTGF) and α -smooth muscle actin (α -SMA) in excisional wounds of BALB/c mice *in vivo*, extracts from the flower of *Calendula officinalis* induce the creation of granulation tissue (Dinda et al., 2016). Moreover, it has been shown that it promotes angiogenesis *in vivo* via the use of a cutaneous wound healing model in rats and the chicken chorioallantoic membrane (CAM) experiment (America, 2018). Since prehistoric times, medicinal plants have been the first line of therapy for wounds, illnesses, infections, and trauma. Humans have been able to recognize and use local plant resources for millennia, and as commerce expanded, they were able to use these resources for both food and medicine. Even though they weren't always tested in rigorous scientific studies, a large number of these "ancient" and traditional medicinal plants have been shown to have therapeutic advantages (Dinda et al., 2016).

Shedoeva et al., (2019) documented the several herbal plants with their clinical use, active ingredients, formulations and bioactivities such as Aloe vera, Blumea balsamifera, Andrographis Paniculata, Boswellia sacra Ru Xiang, Camellia sinensis, and Cinnamomum Cassia etc. For example, Aloe vera also known as Lu Hui containing Acemannan, Arctiin, Chlorogenic acid, Caffeic acid active ingredients with their bioactivities such as immunomodulatory, Antiviral. Anticancer, Antidiabetic as wound healing in clinical use (Shedoeva et al., 2019).

Foundations of Botanical Alchemy

The unique combination of herbalism, alchemy, and esoteric knowledge that is botanical alchemy, also known as herbal alchemy, is a source of great interest. By combining the concepts of chemistry, astrology, and mysticism, it is possible to use it curing different wounds that are thought to provide advantages on both the physical and spiritual levels (Bone and Mills, 2012). In the realm of botanical alchemy, the following are some fundamental aspects:

Alchemy Roots

Beginning with the ancient discipline of alchemy, which aimed to turn base metals into gold and uncover the elixir of life, botanical alchemy may trace its roots back to the beginning of the practice. In addition to their belief in the interconnectivity of the universe, alchemists endeavored to discover the mysteries of the natural world. Several cultures all over the world are credited with being the originators of alchemy, which has roots that go back to ancient history (Martelli, 2015; Principe, 2012).

Ancient Egypt

It is common practice to trace the origins of alchemy back to ancient Egypt when its early practitioners endeavored to comprehend the inner workings of the universe and the transformation of matter. Metals and minerals were the primary materials that Egyptian alchemists worked with. Their goal was to learn the mysteries of immortality and turn base metals into gold (Holmyard, 2012; Principe, 2012).

Hellenistic World

In the Hellenistic world, notably in Alexandria, where it was inspired by Greek philosophy and Egyptian mysticism, the practice of alchemy thrived. Alexandria was the epicenter of this transformation. The development of alchemical concepts throughout this historical period is related to figures such as Hermes Trismegistus, who is often regarded as a mythical sage (Place, 2009).

Islamic Golden Age

Significant progress was made in the field of alchemy across the Muslim world throughout the Islamic Golden Age, which lasted from the eighth to the fourteenth century. For the sake of conserving and improving upon alchemical knowledge, Islamic scholars translated books from Greek and Egyptian cultures. As a result of its close relationship with Islamic mysticism, also known as Sufism, alchemy had a significant role in the advancement of chemistry, medicine, and philosophy (Pormann and Savage-Smith, 2007; Renima et al., 2016).

Medieval Europe

The translation of Arabic books into European languages led to the dissemination of alchemical methods among European scientists, philosophers, and alchemists throughout the medieval period. Alchemy was brought to Europe via these translations. During the medieval period in Europe, alchemy was often linked to the search for the philosopher's stone, a mythological item that was thought to provide immortality and turn base metals into gold (Principe, 2012).

Chinese Alchemy

The practice of alchemy thrived in ancient China at the same time as it was gaining popularity in the West. In Chinese alchemy, also known as "Dan Tao," the hunt for elixirs of immortality and spiritual enlightenment was the primary emphasis. The concepts of Taoism, traditional Chinese medicine, and herbalism were all interwoven into those practices (Ho, 2000).

Alchemy in India

The practice of alchemy, often referred to as "Rasayana" or "Rasashastra," has profound origins in the civilization of ancient India. The goal of the alchemists of India was to cleanse and modify the body by the use of various metals, minerals, and plants. In India, the discipline of alchemy was intimately associated with Ayurveda, yoga, and other related spiritual activities (Pole, 2006).

Three Principles

Traditionally, the practice of alchemy is based on the idea of "solve et coagula," which translates to "dissolve and coagulate." To provide a powerful treatment, this method includes first disassembling plant matter (solve) into its constituent parts, then purifying those parts, and then recombining them (coagula). There are three main concepts that are strongly ingrained in alchemical thought and practice, and they are typically used as a guide for the foundations of botanical alchemy. The comprehension of these principles is necessary in order to comprehend the procedures that are involved in the process of botanical alchemy and the production of HMs. These three are often referred as the "Three Primes" or the "Tria Prima (Martelli, 2015)." They are as follows:

Solve (Dissolve)

The first principle, which is called "solve," entails disassembling the plant material, also known as "solving", to extract its necessary components. Several processes, including maceration, distillation, and fermentation, are all potential means by which this breakdown might take place. Through the process of botanical alchemy, plants are disassembled to liberate their active components, which may include volatile oils, alkaloids, flavonoids, and other phytochemicals. The plant material may be solved, which enables the separation of its different parts and the taking out of its essence, which is said to contain the therapeutic powers of the plant (Doughari, 2012; Micozzi, 2014).

Separate (Purify)

The second concept, which is referred to as "separate," includes sterilizing the components that have been removed using filtering, distillation, or other refining procedures. One of the most important steps in the purification process is the removal of contaminants and the isolation of the elements that are wanted in their purest form. The objective of botanical alchemists is to improve the strength and effectiveness of the herbal treatment while also guaranteeing its safety for use. This is accomplished by isolating the purified components (Heinrich et al., 2017).

Coagulate (Combine)

In order to produce a refined and powerful herbal treatment, the third principle, which is referred to as "coagulate," requires recombining the parts that have been purified. All the parts are put together and blended in specified proportions once the purification process has been completed in order to create a blend that is balanced and harmonious. The purpose of this combination procedure is to create a holistic treatment that targets several areas of health and well-being by combining the medicinal capabilities of the separate components in order to create a synergistic effect (Heinrich et al., 2017; Hoffmann, 2003).

Modern Applications

Although the origins of botanical alchemy may be traced back to ancient periods, the technique is still developing and finding new applications in contemporary herbalism and holistic medical methods. An increasing number of practitioners in today's world are using alchemical ideas to make HMs to cure both the body and the soul. Even currently, botanical alchemy continues to uncover applications in a wide variety of sectors, ranging from herbalism and holistic medicine to developing oneself and spiritual growth. The current applications of botanical alchemy include contemporary knowledge and practices, although they are based on old wisdom and alchemical principles (Khan and Ahmad, 2019; Shedoeva et al., 2019). Fig. 2 shows the relationship between traditional and modern medicine.

HM and Holistic Healing

The discipline of botanical alchemy is frequently used in the field of HM and holistic alternative therapies. When it comes to the creation of herbal treatments, such as tinctures, teas, and essences herbalists and holistic practitioners include alchemical ideas in their work. Not only are these remedies thought to treat physical diseases, but they are also thought to treat underlying energy imbalances and spiritual discord when used properly. The practice of botanical alchemy takes into account the interdependence of the body, mind, and spirit, and thus provides a holistic approach to health and wellbeing (Gladstar, 2012).

Alchemy of Personal Transformation

Personal development and self-transformation are two further areas in which botanical alchemy may be used. Alchemical procedures and herbal treatments are used by individuals to enhance inner alchemy, which in turn facilitates emotional healing, spiritual awakening, and personal progress. Self-discovery, empowerment, and integration are all

possible outcomes that may be achieved via the use of practices such as alchemical traveling, herbal rituals, and plant spirit medicine. When it comes to investigating consciousness, extending awareness, and connecting with one's actual nature, botanical alchemy provides a set of tools that may be used (deBecker, 2017; Winston, 2019).

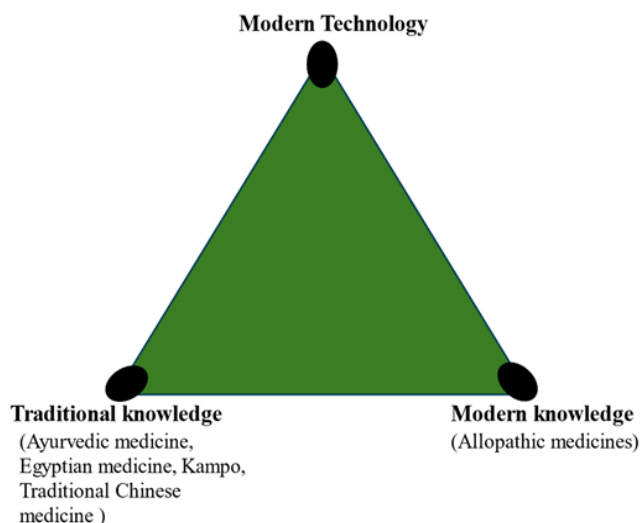


Fig. 2: Relationship between traditional and modern medicine.

Some of the most important characteristics of the contemporary uses of botanical alchemy are as follows:

Alchemy in Ritual and Ceremony

A substantial part in rituals, ceremonies, and other sacred acts is played by the practice of botanical alchemy. In the framework of ceremonial practices, herbal allies are evoked due to the energy characteristics and symbolic importance they possess respectively. Incorporating plant alchemy into rituals might involve ceremonies for healing, shielding, manifestation, and spiritual attunement, among other possible purposes. A sacred environment may be created with the help of herbs, which can also be utilized to generate purpose and strengthen an association with the natural world and the divine (Bird, 2024; Winston, 2019).

Natural Perfumery and Aromatherapy

In the fields of natural perfumery and aromatherapy, whereas plant fundamentals are employed for their fragrant and energetic properties, botanical alchemy has an impact on the activities that surround these fields. Essential oils and plant extracts are combined by aromatherapists and perfumers to produce smells that are designed to elicit certain states of mind, feelings, and emotions. This collection of natural fragrances and fragrant mixtures may be used as instruments for sensory investigation, emotional healing, and spiritual elevation (Rhind, 2014).

Environmental and Plant Conservation

One may develop a more profound appreciation for the natural world via the practice of botanical alchemy, which also encourages environmental care and the preservation of plant life. Practitioners acknowledge the sacred nature of plants and acknowledge the role that plants play as allies in the process of healing and evolving. Specifically, they campaign for the conservation of endangered plant species, as well as sustainable harvesting techniques, ethical wildcrafting, and other similar activities (Hamilton, 2013). Individuals are encouraged to build reciprocal connections with plants and to appreciate the critical contributions that plants make to the well-being of the world via the practice of botanical alchemy, which generates a feeling of reconnecting with nature and reverence for the ground. In general, the current applications of botanical alchemy span a wide variety of activities and fields of study, all of which are brought together by a common respect for the knowledge that plants possess and the transforming potential of alchemy. Botanical alchemy continues to inspire and motivate people on their paths of healing, development, and self-discovery for a variety of reasons, including its use in HM, personal growth, spiritual practice, and environmental activism (Krupnick and Kress, 2005).

Modern Challenges and Solutions

For thousands of years, HM has been a fundamental component of healthcare systems around the globe, providing a sustainable and organic approach to health and well-being. HMs have a long history that is based on indigenous knowledge and antiquated therapeutic techniques. As such, they are still very important in contemporary medicine (Leonti and Casu, 2013). Table 2 represents instances of publications on herbal clinical research.

Respiratory Infections

Infectious diseases of the respiratory system, such as the common cold, influenza, and bronchitis, belong to the most frequent health problems anywhere in the world. It has been established that herbal treatments such as echinacea,

elderberry, ginger, and licorice root possess immunomodulatory and antiviral activities, which enables them to effectively alleviate signs and symptoms and shorten the life span of respiratory infections (Hawkins et al., 2019).

Digestive Disorders

Indigestion, gas, bloating, and irritable bowel syndrome (sometimes abbreviated as IBS) are just a few of the digestive diseases that have been treated with herbal medications for a very long time. Carminative, anti-inflammatory, and spasmolytic characteristics are shown by herbs like peppermint, ginger, chamomile, and fennel, which means that they provide relief from pain in the gastrointestinal tract (Bundy et al., 2004; Grigoleit and Grigoleit, 2005).

Table 2: A few examples of publications of clinical research on herbal medicine.

Example	Purpose/Methodology	Conclusion/Reference
The use of herbs to treat irritable bowel syndrome (IBS)	An RCT with a double-blind design was carried out to evaluate the safety and effectiveness of Chinese herbal medication in treating IBS.	An illustration of research showing the herbal TM's safety and effectiveness (Leung et al., 2006)
Treatment with garlic in kids with high cholesterol.	To find out whether garlic extract treatment is safe and effective for kids with hypercholesterolemia, a double-blind RCT was conducted.	An instance of a trial where claims of "effectiveness" in practical applications were made but "efficacy" was not shown (McCrinkle et al., 1998).
Trial of niprisan HM in SCD sufferers	A double-blind, controlled, randomized cross-over study to assess Niprisan's effectiveness and safety.	In controlling SCD, niprisan is both safe and "effective" (Ameh et al., 2011).
Clinical Trials of Traditional HMs in India	An overview of the many kinds of herbal clinical studies that the Indian Drug Regulation Authority (DCGI) is likely to authorize. According to the DCGI, TM products must follow the procedures for allopathic drugs; Phase I studies may not be required; animal toxicity testing may be minimized; and toxicity studies may not be required for Phase II trials unless the herb will be used for more than three months or has toxicity.	A clinical trial of a herbal drug in India may be conducted for one of the following purposes: i) to assess the herbal material for similar signs that it is generally used; ii) to assess an extract or compound derived from a plant for a non-traditional indication; iii) to assess a substance which has never been utilized before and has not been mentioned in any TM system; and iv) to assess a herb for potential interactions with other drugs (Gupta, 2011).

Cardiovascular Diseases

One of the primary causes of morbidity and death throughout the globe is cardiovascular disease, which includes hypertension, hyperlipidemia, and atherosclerosis. Garlic, hawthorn berry, olive leaf extract, and ginger are some of the herbs that have been shown to have hypotensive, hypolipidemic, and antioxidant actions, which contribute to the treatment of cardiovascular risk factors for the patient (Ried et al., 2013).

Anxiety and Depression

In the treatment of mental health issues including anxiety and depression, herbal medications are an important component of the treatment process. Ashwagandha, holy basil (tulsi), and rhodiola are examples of adaptogenic herbs that have been shown to have anxiolytic and antidepressant qualities. These herbs assist in controlling the stress response and ultimately enhance mood (Sarris et al., 2013).

Immune Support

Increasing immune function and preventing recurring infections are two major goals that herbal treatments aim to accomplish. Several plants have immunomodulatory effects, including astragalus, reishi mushroom, and echinacea. These plants stimulate both innate and adaptive immunity, hence lowering the risk of illnesses (Liu et al., 2015).

Conclusion:

Botanical alchemy incorporates the knowledge of traditional herbal treatment with the developments in modern medicine. Through the integration of these natural cures with traditional treatments, we may foster a more comprehensive approach to overall health. Botanical alchemy encourages us to embrace the healing potential of the natural world while encouraging a closer connection to the environment, as science continues to uncover the scientific foundation for old plant knowledge. This revival of HM opens opportunities for a time in the future when the bounty of nature will still be essential for fostering harmony and good health. Natural alternatives to traditional pharmaceuticals are provided by HMs, which provide a beneficial therapeutic strategy for the management of a broad variety of disorders at the same time. On the other hand, it is of the utmost importance to emphasize the significance of evidence-based practice and to guarantee the safety and effectiveness of herbal remedies by conducting rigorous scientific research and clinical trials. HM continues to make major contributions to the health and welfare of people all over the world by combining ancient medical practices with a contemporary approach to healthcare.

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