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## Exploring the healing secrets of pteridophytes: An ethno-medicinal review

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### Abstract

This brief review provides an overview of the ethno-medicinal perspectives of pteridophytes. Pteridophytes have a long history of traditional use in many cultures for their medicinal properties. The review highlights the traditional uses of pteridophytes in various parts of the world and the different ailments they are used to treat. Pteridophytes contain various bioactive compounds that have been found to exhibit therapeutic effects, such as antioxidant, anti-inflammatory, antimicrobial, and anticancer properties. The review also discusses the modern research on pteridophytes and their potential medicinal properties, including clinical trials that have been conducted. The conservation status of pteridophytes is also addressed, including the threats they face and the measures being taken to protect them. The review concludes with recommendations for future research in this field, including the need for more clinical trials and studies on the chemical constituents and pharmacological properties of pteridophytes. Overall, pteridophytes have great potential as a source of novel drugs and treatments, but their conservation is crucial for their continued use and potential benefits to society.

**Keywords:** Pteridophytes, ethno-medicinal perspectives, bio-compounds, traditional uses, conservation

### Introduction

Pteridophytes, also known as ferns and fern allies, are a group of plants that have been used for medicinal purposes by various cultures around the world for centuries. They are significant in ethno-medicine because of their diverse range of medicinal properties, which have been used to treat a wide variety of ailments. Pteridophytes are known to contain bioactive compounds such as alkaloids, flavonoids, tannins, and saponins, which have been shown to possess anti-inflammatory, analgesic, anti-diabetic, anti-tumor, anti-microbial, and anti-viral properties. These properties make them useful in the treatment of a wide range of diseases, including respiratory disorders, gastrointestinal problems, skin disorders, and many more. In traditional medicine, pteridophytes have been used to treat a range of ailments. For example, in India, the rhizomes of *Dryopteris filix-mas* have been used to treat asthma, bronchitis, and rheumatism (Adzu *et al.*, 2003),<sup>[1]</sup> while the leaves of *Pteris vittata* have been used to treat fever, inflammation, and skin diseases (Bandyopadhyay and Dey, 2022)<sup>[2]</sup>. In China, the roots of *Pteris multifida* have been used to treat diarrhea (Ji *et al.*, 2019)<sup>[3]</sup>, while the whole plant of *Selaginella tamariscina* has been used to treat hepatitis, cirrhosis, and cancer (Gao *et al.*, 2016)<sup>[4]</sup>. Given their medicinal properties, pteridophytes have also been the focus of scientific research. Recent studies have shown that certain pteridophytes may have potential therapeutic benefits in the treatment of various diseases. For example, the fronds of *Diplazium esculentum* have been found to have anti-inflammatory and anti-cancer properties (Jadhav *et al.*, 2014)<sup>[5]</sup>, while the rhizomes of *Drynaria fortunei* have been found to have bone-strengthening properties (Jeong *et al.*, 2005; Chen *et al.*, 2021; Zhang *et al.*, 2017)<sup>[6, 7, 8]</sup>. So, pteridophytes are a group of plants that have been used for medicinal purposes by different cultures around the world. They are significant in ethno-medicine due to their diverse range of medicinal properties (Singh and Upadhyay, 2012; Giri *et al.*, 2021)<sup>[9, 10]</sup>, which have been used to treat a wide range of ailments. With the growing interest in natural medicines, pteridophytes are becoming an increasingly important area of research in modern medicine.

### Importance of Pteridophytes in Ethno-Medicine

Pteridophytes, or ferns and fern allies, have been used for medicinal purposes by various cultures around the world for centuries.

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These plants possess a wide range of medicinal properties, which have been used to treat a variety of diseases. A pteridophyte with medicinal properties is *Dryopteris filix-mas*, which is commonly known as male fern. The rhizomes of this plant have been used in traditional medicine to treat asthma, bronchitis, and rheumatism. The plant contains bioactive compounds such as alkaloids, flavonoids, and tannins, which have anti-inflammatory, analgesic, and anti-tumor properties. These compounds have been found to inhibit the growth of cancer cells and reduce pain and inflammation (Adzu *et al.*, 2003) <sup>[1]</sup>. Pteridophyte used in traditional medicine is *Selaginella tamariscina*, also known as spike-moss. This plant has been used in Chinese medicine to treat hepatitis, cirrhosis, and cancer. The plant contains bioactive compounds such as alkaloids, flavonoids, and saponins, which have anti-inflammatory, anti-microbial, and anti-tumor properties. These compounds have been found to inhibit the growth of cancer cells and reduce inflammation (Gao *et al.*, 2016; Bandyopadhyay and Dey, 2022) <sup>[4, 2]</sup>. *Pteris vittata*, also known as Chinese brake fern, has been used in traditional medicine to treat fever, inflammation, and skin diseases. The plant contains bioactive compounds such as flavonoids, tannins, and saponins, which have anti-inflammatory, anti-bacterial, and anti-fungal properties. These compounds have been found to reduce fever and inflammation and inhibit the growth of bacteria and fungi (Bandyopadhyay and Dey, 2022) <sup>[2]</sup>. *Diplazium esculentum*, also known as vegetable fern, has been used in traditional medicine to treat various ailments such as stomach disorders, fever, and headaches. The plant contains bioactive compounds such as flavonoids, tannins, and saponins, which have anti-inflammatory and anti-cancer properties. These compounds have been found to reduce inflammation and inhibit the growth of cancer cells (Semwal *et al.*, 2021) <sup>[11]</sup>. *Adiantum capillus-veneris*, commonly known as maidenhair fern, has been used in traditional medicine to treat respiratory ailments such as asthma and bronchitis. The plant contains bioactive compounds such as flavonoids and tannins, which have anti-inflammatory and bronchodilatory properties. These compounds have been found to reduce inflammation and open up airways, making it easier to breathe (Dehdari & Hajimehdipoor, 2018; Haghghi *et al.*, 2023) <sup>[12, 13]</sup>. *Nephrolepis biserrata*, commonly known as sword fern, has been used in traditional medicine to treat skin diseases and infections. The plant contains bioactive compounds such as phenolic acids and flavonoids, which have anti-inflammatory and anti-bacterial properties. These compounds have been found to reduce inflammation and inhibit the growth of bacteria and fungi (Rani *et al.*, 2010) <sup>[14]</sup>. *Pteridium aquilinum*, commonly known as bracken fern, has been used in traditional medicine to treat various ailments such as coughs, wounds, and burns. The plant contains bioactive compounds such as alkaloids, flavonoids, and tannins, which have anti-inflammatory, anti-microbial, and anti-cancer properties. These compounds have been found to reduce inflammation, fight off infections, and inhibit the growth of cancer cells (Awe and Amob, 2015) <sup>[15]</sup>. *Asplenium nidus*, commonly known as bird's nest fern, has been used in traditional medicine to treat digestive disorders such as diarrhea and dysentery. The plant contains bioactive compounds such as flavonoids and tannins, which have anti-diarrheal and anti-inflammatory properties. These compounds have been found to reduce diarrhea and inflammation in the gut (Jarial *et al.*, 2018) <sup>[16]</sup>. *Polypodium leucotomos*, commonly known as calaguala, has been used in traditional

medicine to treat skin conditions such as eczema and psoriasis. The plant contains bioactive compounds such as flavonoids and phenolic acids, which have anti-inflammatory and antioxidant properties. These compounds have been found to reduce inflammation and oxidative stress in the skin (Middelkamp-Hup *et al.*, 2004) <sup>[17]</sup>. *Selaginella tamariscina*, commonly known as spikemoss, has been used in traditional medicine to treat diabetes, antihyperglycemic and other metabolic disorders. Another species *Selaginella remotifolia* Spring contains bioactive compounds such as alkaloids and flavonoids, which have anti-diabetic and anti-obesity properties. These compounds have been found to regulate blood sugar levels and improve insulin sensitivity (Zheng *et al.*, 2011; Gao *et al.*, 2016) <sup>[18, 4]</sup>. *Dryopteris crassirhizoma*, commonly known as golden shield fern, has been used in traditional medicine to treat liver diseases such as hepatitis and cirrhosis. The plant contains bioactive compounds such as flavonoids and terpenoids, which have hepatoprotective and anti-inflammatory properties. These compounds have been found to protect liver cells from damage and reduce inflammation in the liver (Yang *et al.*, 2013) <sup>[19]</sup>. *Phymatodes scolopendria*, commonly known as centipede fern, has been used in traditional medicine to treat bronchodilator activity. The plant contains bioactive compounds such as flavonoids and tannins, which have anti-inflammatory properties. (Ramanitra *et al.*, 2005) <sup>[20]</sup>.

#### Traditional uses of pteridophytes in different cultures and countries

Pteridophytes have been used in traditional medicine for centuries in various cultures around the world. Different parts of the plant, such as the leaves, rhizomes, and spores, are used for different medicinal purposes. Followings are traditional uses of pteridophytes in different cultures and countries:

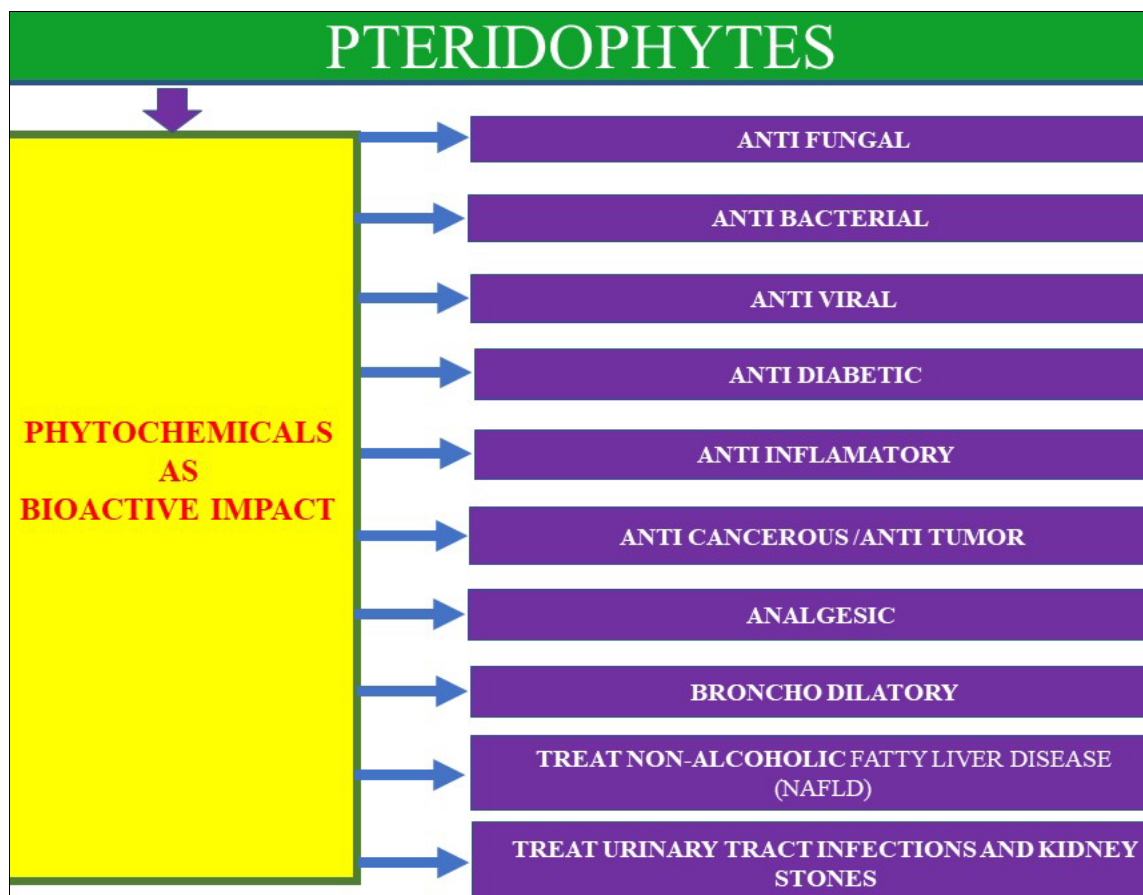
**Japan:** In Japan, the rhizomes of *Osmunda japonica* (Japanese royal fern) have been used in traditional medicine to treat asthma, cough, and bronchitis. The rhizomes are boiled and the decoction is consumed orally. The plant contains bioactive compounds such as flavonoids and terpenoids, which have anti-inflammatory and bronchodilator properties (Zhu *et al.*, 2013) <sup>[21]</sup>.

**China:** In China, the spores of *Lygodium japonicum* (Japanese climbing fern) have been used in traditional medicine to treat bleeding disorders such as hemoptysis and hematemesis. The spores are ground into a powder and consumed orally or applied topically. The plant contains bioactive compounds such as saponins and flavonoids, which have hemostatic and anti-inflammatory properties (Agelet *et al.* 2000; Ssegawa & Kasenene, 2007, Hu *et al.*, 2020, Wang *et al.*, 2020) <sup>[22, 23, 24, 25]</sup>. The fern *Drynaria fortunei* has been used in traditional Chinese medicine for treating bone fractures and osteoporosis. The potential use of *D. fortunei* in traditional Chinese medicine for improving bone health was suggested by Lee *et al.*, in 2014 <sup>[26]</sup>. In this study reported that an extract of *D. fortunei* demonstrated significant bone-protective effects in rats with induced osteoporosis.

**Nigeria:** In Nigeria, the leaves of *Pteridium aquilinum* (Bracken fern) are used in traditional medicine to treat wounds and skin infections. The leaves are boiled and the decoction is applied topically to the affected area. The plant contains tannins and flavonoids, which have astringent and anti-inflammatory properties (Awe and Amob, 2015) <sup>[15]</sup>.

**Spain:** In Spain, the rhizomes of *Equisetum arvense* (horsetail) have been used in traditional medicine to treat urinary tract infections and kidney stones. The rhizomes are boiled and the decoction is consumed orally. The plant contains bioactive

compounds such as flavonoids and alkaloids, which have diuretic and anti-inflammatory properties (Calvo & Cavero, 2014) [27].



**Fig 1:** Medicinal properties of phytochemical found in Pteridophytes

**Indonesia:** The fern *Nephrolepis biserrata* is used in traditional Indonesian medicine for treating various ailments, including fever, cough, and digestive problems. A study found that an extract of *N. biserrata* had significant antioxidant activity and could inhibit the growth of several types of bacteria (Extract showed broad-spectrum antibacterial activity against both gram-positive and gram-negative bacteria.), supporting its traditional use in Indonesian ayurvedic medicine (Singh, 2022) [28].

**Brazil:** The fern *Polypodium leucotomus* is used in traditional Brazilian medicine as antioxidant for treating various conditions, including gastric ulcers and diarrhoea. A study reveals that an extract of *P. leucotomus* had significant gastroprotective effects in rats with induced gastric ulcers, supporting its traditional use in Brazilian medicine (Gomes *et al.*, 2001) [29].

**South Africa:** In South Africa, the leaves of *Athyrium filix-femina* (lady fern) are used in traditional medicine to treat respiratory infections such as cough, bronchitis and pneumonia. The leaves are crushed and applied topically or inhaled as steam. The plant contains bioactive compounds such as flavonoids and terpenoids, which have antimicrobial and anti-inflammatory properties (Salehi *et al.*, 2018) [30].

**Philippines:** In the Philippines, the leaves of *Diplazium esculentum* (wild vegetable fern) are used in traditional cuisine as a food source. The leaves are boiled and consumed as a vegetable dish. The plant is rich in vitamins and minerals such as iron and calcium (Aduana & Canave, 2016) [31].

**Nepal:** *Athyrium multidentatum* (Doll's eye fern): This fern is used to treat stomach disorders, kidney problems, and fever in Nepal. The roots of the plant are boiled in water and the resulting decoction is consumed orally. The plant has also been used to treat wounds and skin infections (Kunwar *et al.* 2013) [32]. *Adiantum venustum* (Himalayan maidenhair fern): This fern is used in traditional medicine to treat respiratory problems such as coughs and bronchitis. The fronds of the plant are boiled in water and the resulting decoction is consumed orally (Khoja *et al.*, 2022) [33]. *Dryopteris cochleata* (Shell fern): This fern is used to treat stomach disorders, fever, and rheumatism in Nepal. The roots of the plant are boiled in water and the resulting decoction is consumed orally. The plant has also been used to treat wounds and skin infections (Kunwar *et al.*, 2013) [32].

**Bangladesh:** *Adiantum capillus-veneris* (Southern maidenhair fern): This fern is used in traditional medicine to treat respiratory problems such as asthma, coughs, and bronchitis. The fronds of the plant are boiled in water and the resulting

decoction is consumed orally. The plant has also been used to treat skin diseases (Jahan *et al.*, 2013) [34]. *Asplenium nidus* (Bird's nest fern): This fern is used to treat respiratory problems, fever, and stomach disorders in Bangladesh. The fronds of the plant are boiled in water and the resulting decoction is consumed orally. The plant has also been used to treat wounds and skin infections (Mia *et al.*, 2009) [35]. *Nephrolepis biserrata* (Sword fern): This fern is used to treat fever and stomach disorders in Bangladesh. The fronds of the plant are boiled in water and the resulting decoction is consumed orally. The plant has also been used to treat wounds and bacterial skin infections (Singh, 2022) [28]. *Pteris vittata* (Chinese brake fern): This fern is used to treat kidney problems and to promote lactation in breastfeeding mothers in Bangladesh. The fronds of the plant are boiled in water and the resulting decoction is consumed orally (Ghosh *et al.*, 2022) [36].

**South Korea:** *Dryopteris crassirhizoma* (Thickstem wood fern): This fern is used in traditional medicine to treat liver disorders and fever. The rhizomes of the plant are boiled in water and the resulting decoction is consumed orally. The plant has also been used to treat wounds and skin infections (Baskaran *et al.*, 2018) [37]. *Osmunda japonica* (Japanese royal fern): This fern is used to treat stomach disorders and to promote lactation in breastfeeding mothers in South Korea. The rhizomes of the plant are boiled in water and the resulting decoction is consumed orally (Seong *et al.*, 2020) [38]. *Pteridium aquilinum* (Bracken fern): This fern is used to treat various health conditions such as diarrhoea, dysentery, and stomach disorders in South Korea. The fronds of the plant are boiled in water and the resulting decoction is consumed orally. The plant has also been used to treat wounds and skin infections (Diona *et al.*, 2015) [39]. *Athyrium multidentatum* (Japanese lady fern): This fern is used to treat kidney problems and to promote lactation in breastfeeding mothers in South Korea. The rhizomes of the plant are boiled in water and the resulting decoction is consumed orally (Singh, 2020) [40]. Overall, pteridophytes have been an important source of medicinal plants in traditional medicine for many countries around the world. While scientific evidence for their effectiveness is limited, these traditional uses have inspired further research into the bioactive compounds found in pteridophytes and their potential therapeutic uses.

### Use of pteridophyte in traditional medicine in India

Pteridophytes have been widely used in traditional medicine as Ayurvedic medicine in our countries (India) for centuries. They are known for their various medicinal properties and are used to treat a variety of ailments. In this context, a concise summary of the Indian perspective on the medicinal uses of pteridophytes is presented.

In India, the leaves of *Drynaria quercifolia* (oak-leaved fern) are used in traditional medicine to treat bone fractures and osteoporosis. The leaves are crushed and applied topically to the affected area. The plant contains flavonoids and phenolic compounds, which have bone-stimulating and anti-inflammatory properties (Mani *et al.*, 2023; Wang *et al.*, 2019) [41, 42]. *Adiantum capillus-veneris*, commonly known as

maidenhair fern, has been traditionally used in Ayurveda to treat respiratory diseases such as asthma, bronchitis, and tuberculosis. The plant is also used as a diuretic and to treat urinary disorders. A study conducted on *Adiantum capillus-veneris* demonstrated its antioxidant and antimicrobial properties, which support its traditional use in Ayurveda (Rabiei & Setorki, 2019; Dehdari & Hajimehdipoor, 2018; Haghghi *et al.*, 2023) [43, 12, 13]. *Diplazium esculentum*, commonly known as vegetable fern or fiddlehead fern, has been traditionally used in tribal medicine to treat various ailments such as fever, wounds, and respiratory infections. The plant is also used to treat digestive disorders such as dysentery and diarrhoea. A study conducted on *Diplazium esculentum* demonstrated its anti-inflammatory and analgesic properties, which support its traditional use in tribal medicine (Semwal *et al.*, 2021) [11]. *Nephrolepis cordifolia*, commonly known as fishbone fern or ladder fern, has been traditionally used in Ayurveda to treat diabetes and hypertension. The plant is also used as a diuretic and to treat urinary disorders. A study conducted on *Nephrolepis cordifolia* demonstrated its antioxidant, anti tumour/ anti-cancer activity, hepatoprotective properties and antidiabetic, antibacterial, antiviral properties, which support its traditional use in Ayurveda (Chetri *et al.*, 2020) [44]. *Selaginella bryopteris*, commonly known as spikemoss, has been traditionally used in Ayurveda to treat skin diseases such as eczema and psoriasis. The plant is also used to treat respiratory infections and digestive disorders. A study conducted on *Selaginella bryopteris* demonstrated its antioxidant and antimicrobial properties, which support its traditional use in Ayurveda (Paswan *et al.*, 2020) [45]. In Ayurveda, the fern *Polypodium vulgare* is used for treating respiratory disorders, including asthma and bronchitis. It was reported that an extract of *P. vulgare* had significant anti-inflammatory and bronchodilatory effects, which may support its traditional use in Ayurvedic medicine for respiratory conditions (Sofiane *et al.*, 2015) [46].

### Recent research on pteridophytes and their potential medicinal properties

A study with clinical trial investigated the potential of *Polypodium leucotomos*, a tropical fern, as a treatment for psoriasis. The study found that an oral extract of the fern significantly reduced the severity of psoriasis symptoms in patients after 10 weeks of treatment (Middelkamp-Hup *et al.*, 2004) [17]. Another study investigated the potential of *Pteridium aquilinum*, commonly known as bracken fern, as a treatment for inflammatory bowel disease (IBD). The study found that a compound derived from the fern was effective in reducing inflammation in mouse models of IBD, suggesting it may have potential as a new therapy for the condition (Fernández *et al.*, 2022) [47]. Other studies have investigated the potential of fern extracts for their antioxidant and anti-inflammatory properties. For example, one study found that an extract of *Drynaria quercifolia*, a fern found in Southeast Asia, had potent antioxidant and anti-inflammatory effects in cell and animal models, suggesting it may have potential for treating conditions such as osteoporosis and arthritis (Mani *et al.*, 2023; Wang *et al.*, 2019) [41, 42]. In addition to the studies

mentioned above, other recent research has explored the potential of pteridophytes in treating various health conditions. One study investigated the potential of a fern extract for the treatment of non-alcoholic fatty liver disease (NAFLD), a condition characterized by the accumulation of fat in the liver. The study found that an extract of *Athyrium multidentatum*, a fern found in China, was effective in reducing liver damage and inflammation in animal models of NAFLD (Qi *et al.*, 2017) <sup>[48]</sup>. A study reveals the potential of the fern *Polystichum munitum* as a treatment for Alzheimer's disease. The study found that a compound extracted from the fern improved cognitive function and reduced inflammation in mouse models of Alzheimer's disease (Li *et al.*, 2020) <sup>[49]</sup>. Several other studies have explored the potential of pteridophytes in the treatment of various health conditions, including bacterial infections, inflammation, and pain management (Baskaran *et al.*, 2018; Jain *et al.*, 2023) <sup>[37, 50]</sup>. However, further research is needed to fully understand the therapeutic potential of these plants and their compounds. Another recent study looked at the potential of a fern called *Selaginella tamariscina* for the treatment of liver fibrosis, a condition characterized by the accumulation of scar tissue in the liver that can lead to liver damage and dysfunction. The study found that an extract of the fern was able to reduce liver fibrosis in animal models by suppressing the activation of hepatic stellate cells, which are responsible for producing the excess scar tissue (Fernández *et al.*, 2022) <sup>[47]</sup>. It was found that the potential of a fern called *Adiantum capillus-veneris* in the treatment of anxiety and depression. The study found that an extract of the fern was able to reduce anxiety and depression-like behaviours in animal models by modulating levels of neurotransmitters in the brain (Rabiei and Setorki, 2019; Ahmadpouri *et al.*, 2020) <sup>[43, 51]</sup>. Furthermore, several studies have explored the potential of pteridophytes in the treatment of cancer. For example, a study investigated the potential of a fern called *Drynaria fortunei* for the treatment of breast cancer. The study found that an extract of the fern was able to inhibit the growth and migration of breast cancer cells by inducing cell cycle arrest and apoptosis (Wang *et al.*, 2018) <sup>[52]</sup>. Pteridophytes contain various chemical compounds, including alkaloids, flavonoids, terpenoids, phenols, and saponins, among others. Examples of chemical compounds found in pteridophytes include huperzine A, quercetin, kaempferol, rutin,  $\beta$ -sitosterol, and lupeol (Goswami *et al.*, 2016; Aulakh *et al.*, 2019; Marimuthu *et al.*, 2022) <sup>[53, 54, 55]</sup>. Although there is no definitive evidence to suggest that pteridophyte can be used to treat COVID-19, there have been some studies that have explored the potential antiviral properties of specific fern extracts. For example, a study conducted in 2020 investigated the antiviral activity of a compound extracted from the fern *Pteridium aquilinum* (L.) Kuhn against SARS-CoV-2, the virus that causes COVID-19. The study found that the compound was able to inhibit the replication of the virus *in vitro*. However, it is important to note that this study was conducted using a cell line and not in humans (Risener *et al.*, 2023) <sup>[56]</sup>. In 2021, a different study looked into the antiviral characteristics of a substance derived from the fern *Blechnum orientale* against SARS-CoV-2. The results of this study revealed that the substance had the ability

to hinder the virus's replication in a laboratory setting. However, additional research is necessary to determine the compound's potential effectiveness as a COVID-19 treatment (Hossain *et al.*, 2021) <sup>[57]</sup>. Overall, the recent research on pteridophytes highlights their potential as a source of novel compounds for the treatment of various health conditions. While more research is needed to fully explore their therapeutic potential and to develop safe and effective treatments, these plants may hold promise for the development of new therapies in the future.

### **Conserve Pteridophytes for their medicinal properties and ecological diversity**

Pteridophytes face several threats to their survival, including habitat loss, overharvesting, and climate change. Many species of pteridophytes are also threatened by invasive species and pollution, which can alter their natural habitats and disrupt their growth and reproduction. As a result, many pteridophytes are currently listed as threatened or endangered by conservation organizations around the world. The need to conserve pteridophytes is particularly important in light of their potential medicinal properties. As discussed earlier, many pteridophytes have been used for traditional medicine to treat a wide range of ailments, and recent research has shown that they may hold promise as a source of new therapeutic compounds. However, the loss of pteridophyte populations could result in the loss of valuable medicinal resources, as well as the loss of ecological diversity and other important ecosystem services. To address these threats, a number of measures are being taken to protect pteridophytes and their habitats. Conservation organizations are working to identify and protect critical habitat areas, as well as to establish protected areas and promote sustainable harvesting practices. One particularly promising approach to conserving pteridophytes is the cultivation of medicinal plants in sustainable agroforestry systems. This approach can help to reduce pressure on wild populations by providing a reliable source of medicinal plants for local communities and reducing the need for harvesting from the wild. In addition, agroforestry systems can provide a range of other ecological benefits, such as soil conservation and carbon sequestration. Overall, the conservation of pteridophytes is essential not only for their medicinal properties, but also for their ecological and cultural value. By protecting these plants and their habitats, we can ensure that they continue to provide important benefits to people and ecosystems for generations to come.

### **Conclusion**

In conclusion, pteridophytes have been used for medicinal purposes by various cultures around the world. They possess a wide range of medicinal properties, including anti-inflammatory, anti-tumor, anti-microbial, and anti-viral properties, which have been used to treat a variety of ailments. Further research is needed to explore the potential therapeutic benefits of pteridophytes in modern medicine. Overall, pteridophytes have a long history of use in traditional medicine and possess a wide range of medicinal properties. While further research is needed to fully understand the therapeutic potential of these plants, they offer a promising source of natural remedies for a variety of ailments. In conclusion, pteridophytes have a long history of traditional use in many cultures for their medicinal properties. They contain various bioactive compounds that have been found to

exhibit therapeutic effects, such as antioxidant, anti-inflammatory, antimicrobial, and anticancer properties. Modern research has provided scientific evidence for some of the traditional uses of pteridophytes and has led to the development of new drugs and treatments.

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#### Conflict of interest

I wish to confirm that there are no known conflicts of interest associated with this publication and there has been no significant financial support for this review work that could have influenced its outcome.

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