Plants for ages have helped in satisfying hunger and supplementing a diet. For centuries man has gained and handed on knowledge about their properties, both curative and poisonous. However, this close relationship with plants had also different meaning, not only a physical one, but also spiritual that was connected with beliefs in extraordinary power of some plants. Plants had their place in magical arts, customs or certain forms of religion. Here we take a closer look at three chosen species in different areas connected with humans. Bracken rhizomes, during difficult times of limited food availability, were used for culinary purposes. Seeds of bladder-nut were popular in adornments and rosaries, this shrub was also considered to have magical power. Mistletoe established its reputation as a cult plant, moreover it was and still is in use in medicine.

Pteridium

Pteridium aquilinum is a cosmopolitan species with an almost worldwide distribution apart from mountainous, desert and arctic areas. P. aquilinum subsp. aquilinum occurs mainly in the northern hemisphere, whereas P. aquilinum subsp. caudatum dominates in the southern hemisphere (Thomson 2000; Thomson and Alonso-Amelot 2002). Pteridium reproduces mainly vegetatively. Its rhizomes are located deep underground so that they are protected both against frost and fire. On burnt areas Pteridium produces leaves very quickly, blocking the light available to other competitors (Stickney 1986; Taylor 1986). Additionally, it has the ability to release allelopathic phytotoxins to prevent or moderate other plant growth in the nearest vicinity (Brown 1986). The present distribution of Pteridium aquilinum in Poland is presented on fig. 1 (Zając and Zając 2001).

Because acid substratum facilitates the germination of spores (Page 1986), in fire-prone areas, especially in

![Distribution of bracken (Pteridium aquilinum (L.) Kuhn) in Poland (Zając and Zając 2001).](image-url)
places where forest fires occur, the occurrence of a large number of young Pteridium specimens has been observed (Oberdorfer 1990), contributing to a decrease in substratum pH. Pteridium aquilinum is a pioneer plant which does not tolerate shading. It occurs in disturbed localities (Jackson 1981), in forest clearings and forest edges. It frequently occupies moors, drying swamps and appears in fields under cultivation.

In Poland, Pteridium aquilinum spores have been recorded since the end of the Vistulian (fig. 2). Their greatest abundance in pollen spectra is noticeable between 8000-5000 BP, during which Pteridium constituted an important element of pine and mixed deciduous forests (Madeja et al. 2004). Undoubtedly, the frequent occurrence of Pteridium aquilinum at this time was connected with forest clearing by Mesolithic and Neolithic human groups.

The Polish name “orlica” refers to the vascular bundle arrangement in the stipe which on cross-sections is reminiscent of a flying, double eagle. Pteridium aquilinum is one of the many members of the plant world that have practical and diverse uses. Despite its worldwide distribution, the range of basic applications is very similar across its range and is connected mainly with use as a food source. In Europe, western bracken rhizomes were consumed most likely even in the Middle Stone Age (Göransson 1986). Its poisonous qualities have been known for a long time. Ptaquiloside - the main toxin of bracken - causes frequent intoxications and even leads to death of domestic animals, while thiaminase, another active agent, causes disturbance in the absorption of vitamin B1 (Fenwick 2006; Yamada et al. 2007). In Japan and Korea, where bracken is an important dietary element, an archaic method of disposing of the toxic substances from young plant parts is used even today. This method consists of soaking bracken in water for a day with the addition of ash, and boiling afterwards; young plants can then be consumed as a vegetable or as a soup (called “warabe”) (Pieroni 2005). A similar way of discarding the toxic residues and bitter taste is given in the guidebook entitled: Dzikie rośliny jadalne Polski. Przewodnik survivalowy (Wild edible Polish plants. Survival Guidebook, in Polish) (Łuczaj 2004).

Because bracken’s rhizomes contain up to 60% starch, they were often dried and used as a valuable starch source. Unfortunately, they have a bitter, unpleasant taste that is hard to get rid of. One way of eliminating the taste involves drying (in this state they can be stored for years), removing the black peel and threshing with the use of a stick, causing the disintegration of the dry farinaceous parts from among the hard, oblong fibers (Łuczaj 2004). Rhizomes grinding yielded similar results. Flour obtained in this way was commonly added to bread baking, especially during periods of famine. In France this kind of bread was baked during the Great Famine (Coquillat 1950). The oldest written information related to using ferns as a source of food in Great Britain reads as follows: «Poor people made the bread of fern roots» (Caxton 1480).

During the First World War, which significantly limited food availability for people as well as for animals, greater attention was paid to the possibility of using rhizomes of bracken as food. Such observations were initiated in Scotland and conducted also in other countries (Hendrick 1919). Recipes for boiled bracken leaves appeared in British newspapers at that time (Braid 1934). Suggestions included using green, still twisted leaves as an asparagus substitute and also the possibility of using young rhizomes for brewing.

Both bracken rhizomes and leaves were used as fodder for domestic animals. In Wales, shredded dried leaves mixed with straw or hay were given to horses and mules pulling trams during winter. Leaves were also given to rabbits.

Because of its chemical properties, bracken was used in folk medicine for a long time. Dried, powdered rhizomes were utilized most often. Powder was added to wine or water sweetened with honey. A drug prepared in this way was known for its anti-ascaris and anti-parasitic properties. There is also a known analgesic property of the aqueous extract made from bracken rhizomes (Pieroni and Quave 2005); in Poland there is a conviction that compresses made of dried bracken leaves bring relief from rheumatic pain (personal information).

Pteridium was also used as an abortive agent in domestic animals (Viegi et al. 2003).
The charcoal (cinder), result of the burning of bracken leaves, mixed with a small amount of olive oil, was also used to treat bite wounds caused by wolves (Guarrera et al. 2005).

Apart from the common use as a source of food and medicinal substances, _Pteridium_ also had a whole spectrum of other practical, and sometimes amazing uses.

Because of the high potassium content in ash, after lixiviation bracken was a frequent additive in glass production during the Middle Ages (Jackson and Smedley 2008). Ash from bracken was also used as a cheap washing detergent for clothes. Ash balls were often bought as a universal washing agent (Morris 1947). After mixing ash with oil and suet, more expensive washing detergents, soaps, were made. As a highly energetic plant, bracken was used as fuel from which briquettes burned in stoves were made (Callaghan et al. 1981). Bracken leaves were used to thatch roofs and also as bedding for cattle. They were also processed for compost (Pitman and Webber 1998). In the Mediterranean area bracken leaves are frequently used by shepherds to filtrate sheep milk and for freshly made ricotta cheese preservation (Pieroni 2005). The germicidal and fungicidal substances contained in bracken leaves make food wrapped in them resistant from perishing. Some gardeners in Poland who avoid available commercial chemical plant protection products use an aqueous extract from bracken leaves for spraying plants in order to control plant lice or for watering plants as an anti-snail agent (personal information).

Human activity contributed to an increase in the area occupied by bracken at least since the Middle Stone Age. Observations from Finland (Oinonen 1976) show a correlation between an increase of new areas occupied by bracken and periods when warfare took place. Warfare induced frequent forest fires that promoted the spread of bracken. Today, the continuing expansion of _Pteridium_ species is troublesome and hard to control in Europe and globally (Cox et al. 2007; Pakeman et al. 2005; Hartig and Beck 2003).

Human intervention made it possible for bracken to spread to new areas, made use of the plant through various applications, and frequently helped bracken survive hard times. Now man is trying to find a way to stop the expansion of bracken.

**Viscum**

_Viscum_ is an amazing plant that lives at the expense of its hosts which constitute various tree species. In autumn and winter, when trees stand leafless, green spheres of various size, formed by the twigs of _Viscum_, can be seen from afar. Underneath the bark of the host tree, mistletoe forms a branched system of suckers used to absorb water and mineral salts. Because of its evergreen, olive-green coloured leaves and twigs that seem to be dychotomically branched, _Viscum_ can assimilate self-sufficiently. Mistletoe’s shoots divide into nodes and internodes. A new dichotomy appears every year, so by counting these it is possible to determine the age of the plant. Individuals can live for 30–40 years (Stypiński 1997). There is considerable variation in _Viscum_ in the selection of tree species as hosts, particular subspecies demonstrate important differences in this regard. _Viscum_ occurs on trees that are 20 years old at least. It also shows preferences for trees that grow in soils rich in calcium carbonate.

Mistletoe is dioecious and is usually in bloom from February till April. Male flowers are characterized by a single yellow-green perianth with four sepals that join at the base and form a short tube. Instead of typically formed stamens, at the base of the perianth occur up to 50 anthers that burst and enable the spread of pollen. These flowers also produce a large amount of nectar. Female flowers usually occur in trios surrounded by a small inconspicuous perianth, they also produce nectar but, in contrast to male flowers, they possess very little detectable odour. Flowers are probably pollinated by insects among which bees probably play an important role. Nevertheless some researchers claim that this plant is also wind-pollinated. Mistletoe is a sparse pollen producer (fig. 3) (Stypiński 1997). Berries grow on female specimens after spring pollination. These mature in late autumn or winter and can be distributed by birds, mostly by waxwings and mistle thrushes, which swallow whole fruits and enable long distance dispersal. Other birds nibble fruits which can easily attach to the branches.

3. - Pollen grain of mistletoe (Viscum album (L.)).
of the host-tree due to their sticky flesh, afterwards they form suckers and eventually roots.

Mistletoe is a phytotoxicant of environmental contamination with heavy metals (Stypiński 1981, 1997). However, the branches of trees on which it parasitizes are deprived of water and mineral substance inflow which can lead to desiccation. If there are many specimens on one tree, *Viscum* may cause the death of the host.

Fossil remains of the genus *Viscum* were identified in the younger periods of the Neogene. They were accompanied by tree genera including maple (*Acer*), birch (*Betula*), lime (*Tilia*), elm (*Ulmus*), hornbeam (*Carpinus*), beech (*Fagus*) and walnut (*Juglans*). Mistletoe was the main component of mesotrophic deciduous forests (Stuchlik et al. 1990). *Viscum* pollen was found quite often in the interglacial flora (Janczyk-Kopikowa 1977).

An examination of isopollen maps of Poland reveals that mistletoe percentages in the pollen assemblages are discontinuous and low (<0.6%). In the Holocene, *Viscum* pollen appeared about 9000-8500 years BP in central Poland, at the foot of the Tatra Mountains and in the Sudetes. Between 8500-7500 years BP, *Viscum* expanded gradually and about 3500 years BP its range spread across the whole country (Granoszewski et al. 2004). According to Jacomet and Kreuz (1999) the presence of mistletoe pollen grains indicates a mean temperature of the warmest month over 15°C and very warm summer seasons. This taxon is also indicative of a mean temperature in January higher than -7°C. Mistletoe is a Eurasian plant; according to Hegi (1957) it is a Boreomediterrial-Euroasian-Oceanic species. The present distribution of *Viscum* in Poland is presented on fig. 4 (Zając and Zając 2001).

Many legends and customs are associated with mistletoe and the attributes that it is believed to possess. These have been used for practical and cultural purposes for ages. Among the special features of mistletoe that determine its cultural meaning, the most important is the location of this hemiparasite high between the earth and the heavens. This state of suspension means that mistletoe is positioned in a boundary zone, and results in a possibility of mediation and representation of the *sacrum* order that has always been radically separated from the mortal world. Another important feature is that it never yields its green colour, even if the parasitized tree loses its leaves. This everlasting green is a demonstration of permanency, invariability, and a defiance of the destructive influence of time (Kowalski 2007). Mistletoe was called a “golden branch”, because if its leaves are dried it changes colour from green to yellow-gold, associated with sunlight and eternity. It may also be linked to the underworld, another sign of mistletoe’s attachment to *sacrum*.

Pliny described the circumstances accompanying the taking of mistletoe from oak by celtic Druids. A white-dressed priest would harvest mistletoe five days after a new moon using a special golden sickle. The severed plant should fall into white linen laid under the tree so as not to touch the ground, because if it did it would lose its sacred power. Later practises preserved this special care during the gathering of this plant. According to the Herbarium of Polish Marcin from Urzędów (in the original: Herbarz Polski Marcina z Urzędowa), mistletoe is collected not by cutting using metal tools, nor even by touching the plant itself, but by snapping the twigs through linen and then placing the plant onto another linen sheet laying on the ground. In Slavic tradition mistletoe was gathered during the evening before Christmas Eve. After climbing a tree with mistletoe, the plant was broken off using the head of an axe (not the blade) and was thrown to a man standing under the tree, so as not to let it touch the ground. Mistletoe twigs were put into bee hives in order to obtain plenty of honey the following year (Kowalski 2007). In the Mazovia region mistletoe was burnt and smoke was spread around hives (www.bio-life.pl/art.7749). Mistletoe protected the home from insincere people. It was also said that you must leave a part of a branch on the host tree to avoid misfortune.

According to present folk beliefs, a girl that refuses a kiss under mistletoe may provoke bad luck for herself. It was also believed that if a girl was kissed seven times during a day by seven men, then she would marry one of them that year (Kowalski 2007). Mistletoe is considered to be an aid for people in love and lovers; today, when there is so much tension, separation and divorce, this feature should not be neglected. Thus mistletoe that has been gilded or silver-plated, added to bouquets, decorations and ikebanas enters homes during Christmas
time to bring us best wishes and joy. Surely mistletoe, especially the berries, can be sticky; incautious people may be caught as are flies. There is a well known saying in Poland “to be caught on glue” (in the original: “złapał się na lep”). Maybe this is mistletoe’s revenge for the fact that its twigs are taken nowadays without ceremony and with no respect for primeval rituals (Macioti 2006).

Particular species are used by communities as food (Barlow 1987; Stypiński 1997). Leaves and twigs can be used as fodder for cattle and other animals. During famine, dried and ground mistletoe was added to flour from which bread was baked. Bastiaens et al. (2007), during investigations in a late-Mesolithic locality in Belgium, found large amounts of mistletoe twigs and ivy seeds. Researchers suggest that people collected these evergreen plants for ritual purposes or as fodder for animals during the winter.

Pliny bequeathed an opinion known in ancient times according to which «Gauls believe that mistletoe used in drinks ensures fecundity and is a remedy for all poisons» (Questin 1994). In Polish folk medicine it is also regarded as “an antidote to all poisons and heaven’s gift”. Mistletoe taken from an apple tree or hawthorn protected from fear, especially children, if twigs were placed into a child’s bed then all nightmares were supposed to disappear. The plant most holy for the Druids was oak mistletoe. Pliny wrote: «For Druids there is no greater holiness than mistletoe that on a winter oak is born. Winter oak is for them a tree absolutely divine, it forms sacred groves venerated by them, and its leaves are essential at offering all sacrifices. If on one of the trees a mistletoe shrub appears, it is a certain sign that it came directly from heaven and the tree itself was chosen by one of the gods».

The applications of mistletoe in medicine from Druid times till the beginning of the 20th century were summarized in a monograph by Tubeuf (1923). It was used as a cure for epilepsy, convulsions and to lower blood pressure. Extract from Viscum is helpful for arteriosclerosis and the spitting of blood. It was also prepared as injections that lower blood pressure. Often, especially in folk medicine, mistletoe was used in compresses for wounds and frostbites. Hence, nowadays drinking extracts of mistletoe is worthy of recommendation for many reasons. Likewise, wine that is made from 40 mg of leaves macerated for 10 days in one litre of dry white wine is also recommended. After filtration 100 mg of wine should be drunk twice or three times a day (Macioti 2006). Farmers in villages added leaves of this hemiparasitic plant to fodder, ensuring the fertility of their pigs, increasing milk production in cattle, and augmenting speed and strength in horses.

Modern medicine has not forgotten the magical plant of the Celts. Indeed, it has even broadened its usage. Preparations from mistletoe are used for curing cancer (Kołodziejak-Nieckuła 1994). A drug prepared from Viscum album called Iscador strengthens the immune system and inhibits tumour growth (Stypiński 1997) in anti-cancer therapy and against HIV. Oak mistletoe has the most extensive pharmacological effects as the medication Iscador Q (Iscador Qu). The most active components of this preparation are lectins and viscostoxins. They suppress the divisions of cancer cells and additionally mitigate the side effects of radiotherapy and chemotherapy (www.henryk.gower.pl/viscum.htm).

In cytology mistletoe extract was used to change the cell division mechanism in maize seeds (Zea mays). Enormous polyploid cells were produced under the influence of different concentrations (0,1; 0,01; 0,001 %) of this extract (Stypiński 1967).

Staphylea

The origin of Latin name of genus Staphylea comes from shape of inflorescences, in greek language word ‘staphyle’ means bunch of grapes. Polish name ‘kłokoczka’ comes from characteristic sound called ‘klekot’ that can be heard when fruits are shaken by wind.

If we take into consideration the aspects of distribution (Domin and Podpera 1928; Domin 1949; Gostyńska 1961a; Zając and Zając 2001) and ecology (Browicz 1959; Gostyńska 1961; Tylkowski 2007), bladder-nut is one of the most interesting Polish shrubs. It is the only representative of the genus Staphylea and the family Staphyleaceae in Poland.
The issue of its natural territorial range in our country is still disputable. One of the reasons is the questionable status of particular localities, which is caused by the fact that for the centuries bladder-nut has been used by people as a utilitary plant (Šistek 1932a, 1932b; Jarvis 1979). The presence of this species is limited to southern and south-eastern part of Poland (Zając and Zając 2001) (fig. 5), at the northern limit of its range (Meusel et al. 1978). According to Kornaś and Wróbel (1972) these sites are treated as natural, however many modern localities of this plant are of an antropogenic origin.

*Staphylea pinnata* L. belongs to the east Mediterranean pontic element (Hegi 1965).

Bladder-nut is a termophilous calcicole shrub growing up to 5 m. It is in blossom from May to June, and the seeds ripen from September to November. The bark is olive-grey or brown with oblong white furrows. The leaves are arranged in opposite pairs, and pinnate with 3-7 leaflets. The blossoms are hermaphrodite produced in drooping terminal panicles 5-10 cm long with 5-15 blossoms on each inflorescence, the individual flowers are about 1 cm in their diameter, white and pale pink color, they are pollinated by flies. The fruit is two- or three-lobed capsule 3-10 cm long containing brown hard-shelled seeds (fig. 6).

Fossil remains of seeds and pollen grains of genus *Staphylea* were identified mainly in late Tertiary material. Latałowa (1994) mentioned 4 localities dated to the Holocene, whereas Środoń (1992) listed as many as 43 localities dated to Miocene and Pliocene from Poland.

In the territory of Poland, the earliest reliable excavations where bladder-nut was found dates back to the turn of the 3rd and 4th centuries AD, comes from Próschr Gdańsk (Latałowa 1994). Its seeds, threaded on a silver wire, formed a part of a rich necklace (fig. 7) (Pietrzak and Tuszyńska 1988, Latałowa 1994).

The most interesting folk customs and religious rites connected with this plant have survived the longest in the Podkarpacie region (S-E Poland) (Gostyńska 1962), where the density of natural localities is the highest, and the populations are among the most numerous in the whole country. Hence, this plant is often to be found there in the household gardens.

Bladder-nut’s wood was said to have the power to keep away the evil spirits and the devil. Therefore it used to be carved into crosses, which were later hung above the entrance doors, or put in the corners of the fields in order to prevent natural disasters and ensure a good harvest. The wood was also attached to the horns of the cattle at the beginning of the pasturing season, in order to protect them from evil spells and sickness. In some places, bladder-nut’s wood was used to make walking sticks and plungers for churning butter (Gostyńska 1962).

The amazing white flowers were also used to decorate churches on festive days. In some places inflorescences of this plant are components of palms prepared for ceremonial Palm Sunday and wreaths prepared for Corpus Christi octave. There was folk belief that putting them into the handkerchief of a beloved one secures his love. People trusted in its power of protecting houses from thunderbolts. For all these reasons bladder-
nut was often transplanted into gardens. As an outcome of this popularity, *Staphylea* has disappeared from the forests in some regions of Poland. Probably it was the Celts who first started to plant it on their grave-mounds (Heigi 1965).

Because of their beautiful colour, shape and durability, the seeds were very popular. The aforementioned Celts used them to make various adornments. In the early Middle Ages (10th-12th century) they could have been used as food, together with the green parts of the plant. After the introduction of Christianity, the seeds were used to make rosaries (fig. 7), that is why the bladder-nut shrubs can often be found in cloister gardens. What is more, its seeds contain a lot of fat and can be used as a source of oil. They used to be ground and added into fodder, because it was believed that they can provide good health and longevity for farm animals. They were also used as medicine for ill children, as they were believed to have healing effects. However, overdosed they could cause vomits (Gostyńska 1962).

At present, a research into the chemical compounds contained in the bladder-nut’s leaves, flowers, and seeds is carried out. It turns out that the flowers contain mostly different oxygenated aliphatic hydrocarbons; aldehydes, ketones, esters of higher fatty acids, and hexadecanoic acid with dominating content of tricosane and also of heneicosane, pentacosane, heptacosane, and nonacosane and some nonaliphatic hydrocarbons in the leaves one can find rutine and two saccarides, glucose and saccharose. Plant extracts possess significant cytotoxic and antibacterial activity (Jantova et al. 2001; Laciková et al. 2007).

There are more plants that were satisfying spiritual needs of man and were regarded as sacred, as a gift from heaven, that could be mentioned. People were making deal with them, sometimes full of adoration, respect and admiration, sometimes full of apprehension and fear; they were creating legends of them. All of that probably resulted from the fact that people considered themselves as an element of the surrounding nature, in which plants played, besides different beings, very important, practically an equal to people role.

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