Selected foreign plants in old Polish botanical literature, customs and art (Acorus calamus, Aesculus hippocastanum, Cannabis sativa, Fagopyrum, Helianthus annuus, Iris)

Alicja ZEMANEK¹, Bogdan ZEMANEK¹, Krystyna HARMATA², Jacek MADEJA² and Piotr KLEPACKI¹

¹ Botanic Garden, Institute of Botany, Jagiellonian University, Kraków, Poland
² Department of Palaeobotany, Institute of Botany, Jagiellonian University, Kraków, Poland

Summary

Artykuł przedstawia znaczenie w kulturze polskiej kilku gatunków roślin obcych we florze tego kraju. Omówiono czas ich pojawienia się na terenie Polski, znaczenie użytkowe, obecność w dawnej literaturze botanicznej, kulturze ludowej, sztuce oraz współczesne użytkowanie. Tatarak (Acorus calamus), zadomowiony we florze Polski, przybył tutaj w średniowieczu, w okresie najazdów tatarskich. Starymi roślinami użytkowymi występującymi tylko w uprawie są: gryka (Fagopyrum sp.) oraz konopie (Cannabis sativa). Ze względu na duże znaczenie ekonomiczne w dawnych wiekach ich obszernie opisy znajdują się w literaturze botanicznej oraz kulturze ludowej. Mniej ważnymi roślinami użytkowymi były łyry (Iris sp.) i kasztanowiec (Aesculus hippocastanum), ale ich walory estetyczne sprawiły, że często przedstawiano je w sztuce. Amerykański przybysz - słonecznik (Helianthus annuus), uprawiany w polskich ogrodach, tak silnie związał się z wiejskim krajobrazem, że wyobrażany jest często w sztuce jako składnik „typowo polskiego” krajobrazu.

Acorus calamus

In Poland, the calamus or sweet rush (Acorus calamus) is regarded as an archaeophyte which appeared along with the Tartars’ incursions during Mediaeval times. At present, it is spread across Poland and various applications have been found for it, including traditional uses, as a medicinal plant, around the house, as well as in official medicine and in the cosmetic industry.

“Tatarak” in the oldest Polish botanical literature

The Polish names for the calamus, “tatarak” (related to Tartars), “tatarski korzeń” (Tartar root), “tatarskie ziele” (Tartar herb), appear in mediaeval pharmaceutical/medical works (principally in the 15th century) (Rostafiński 1900: 117-118). Various bits of information have been found in the oldest herals. Stefan Falimirz (died 1534) in his work O ziołach y o moczy gich [On herbs and their power], wrote that the calamus was administered as a medicine that had a diuretic effect, relieved stomach aches, improved digestion, stimulated menstruation, and was also applied on external contusions or bruises (Falimirz 1534: leaf 32, Capitulum 44). The third edition of the Falimirz work prepared for print by Marcin Siennik, includes a drawing of a calamus plant (Siennik 1568: 40). Marcin of Urzedów [Marcin z Urzędowa] (ca 1500-1573) in his work Herbarz Polski [The Polish Herbal] (1595), reports, that “old authors’ (ancient writers) did not know the Tartar herb as it occurs in eastern regions of Europe and western Asia such as “w Podolu, Czerkasiech, Tatarzech” (in Podolya, Tscherkasy, and Tartaria) (Marcin Urzędów 1595: 66, Cap. LXXII). He recommended the calamus as a cough reliever, and menstruation stimulant as well for use against epilepsy. Among the old Polish authors, the most extended description of the calamus was given by Szymon Syreniusz (Simon Syrennius) (ca 1540-1611) in his Zielnik [The Herbal] (1613) (Syrennius 1613: I/3, p. 19-22). He writes that in Poland, the rhizome of this plant was used chiefly as a medicine, whereas the Tartars applied it as aphrodisiac. They eat it raw with bread or boiled as a vegetable “for carnal desires”, because it was said that this plant “excites the carnal cupidity for Venus”. Syreniusz enumerates a number of therapeutical applications for the calamus rhizomes, e.g. to treat stomach aches, toothache, coughs, cramps in limbs, hernia, and dermal lichens, as well as being a diuretic agent, and antidotum in the event of being bitten by a snake or other poisonous animals. He also mentioned its ‘cosmetic’ properties such a breath freshener and for improving one’s complexion (producing a magnificently ruddy complexion). The author of The Herbal provides recipes for many medicinal preparations, and some covering the use of calamus as a food ingredient. These were many, including a thin honey-like drink, syrup, vodka or distillate, and a preparation in sugar or honey, ointment or plaster. According to Syreniiusz, calamus was sometimes added to beer (by soaking a small bag with finely ground rhizome). During a heatwave, the calamus plants sprinkled with water were kept in houses to refresh the air.
In the 18th century, a great deal of information about the calamus was given by Krzysztof Kluk (1739-1796), in Dykcyonarz roślinny [Dictionary of plants] (Vol. I, 1786: 6-7). He wrote about the medicinal uses of the plant, quoting Syreniusz. Apart from that, a recommendation is given for the use of calamus as tasty and healthy seasoning to meat or fish dishes. The consumption of rhizome candied in sugar was also popular at that time, in order to strengthen the stomach and “against bad airs”. It was also believed that water in places where calamus grows is good and tasty, as well as suitable for brewing beer.

**Folk traditions**

In old folk traditions, calamus was applied as a medicine, food or magic item. Dried rhizomes were used for hair washing and water with calamus added was used for bathing infants, as it was said to prevent rickets (Niebrzegowska 2000: 159). In Cracow province, the calamus extract was drunk to treat internal pains (Gustawicz 1882: 216). Till the beginning of the 20th century, the inner parts of the calamus stem were eaten and even today, children playing on river banks enjoy this as a ‘snack’ (Malicki 1971:14-16, after: Łuczaj and Szymański 2007). Calamus was also used in bread baking. Dough laid on a bread shovel was placed on plant leaves e.g. of cabbage, horseradish, maple, oak and calamus, before being put in the oven, as the bread crust should be clean of ash and not scorched. Sometimes poppy seeds were added on top. After baking, these leaves were scratched and not eaten (Gawel 1993: 66-67). Perhaps the calamus leaves were used to give bread a special aroma. Even today, some bread is still baked on leaves, but it is a kind of regional specialty, a kind of delicacy and calamus leaves are no longer used for this purpose. The custom of placing calamus leaves under bread loaves came from Lithuania, which explains its occurrence in south-northern Poland (Bohdanowicz 1987, after Gawel 1993: 67).

The calamus was also used to bedeck houses both for aesthetic and magic purposes, to protect animals and people against ill charms and evil spirits (Lehr 1985: 72). This was done at the holiday of Pentecost (Descent of the Holy Spirit), when the houses were adorned with calamus. The calamus plants were attached to fences, leaves were scattered in the yard and inside houses; some leaves were also shoved into the roof thatch because of the nice smell from their juices (Gustawicz 1882: 216; Niebrzegowska 2000: 160; Siarkowski 1885: 25). «[...] Stuck into the thatched roof in the evening of St. John the Baptist’s day, to protect the house from ghosts and evil spirits - on the night of St. John, witches frolic about, harm people and take away the curative potency from medicinal herbs, which is why the herbs should be collected earlier» (Szulczewski 1932: 96).

**Current uses of calamus in Poland**

The dried rhizome of the calamus (Rhizoma calami) is used to cure diseases of the digestive tract and as a disinfectant. It is included as a component of many drugs and herbal preparations. The calamus oil (Oleum calami) is obtained from rhizomes by steam distillation and used in medicine to treat the ailments of the digestive tract, in the perfume industry as a scent fixative, and in the cosmetic industry to manufacture shampoos and soaps. The presence of some harmful substances in the rhizome of certain varieties of calamus, means that its use in therapy is currently limited (Ozarowski and Jaroniewski 1987; Strzelecka and Kowalski 2000).

The rhizomes and basal parts of calamus leaves candied in sugar were traditionally used to decorate confectionery products (e.g. layered cakes). Nowadays, this use vanishes gradually.

**Aesculus hippocastanum**

The horse chestnut (Aesculus hippocastanum L.), occurring naturally in the mountains of the south-eastern part of the Balkan Peninsula, was introduced into Poland, as in other parts of Europe, in the 17th century as an ornamental tree. Its original and rich foliage, abundant and beautiful blossom, as well as its easy propagation ensured that it became one of the most popular ornamental trees. In some places, it self-propagates and merges with semi-natural forest communities.

**The chestnut in 18th century Polish botanical literature**

The oldest Polish botanical publications do not mention the horse chestnut. In the 18th century, more extensive information about this species was given by Krzysztof Kluk, who wrote that the ‘bitter chestnut’ is grown in gardens and planted along streets (Kluk, Vol. I, 1786: 10-11). According to the same author, the wood of the horse chestnut tree – soft and not durable – was used to make small tables and boxes. Its seeds (“chestnuts”), crushed and mixed with grain had greater application as cattle and poultry fodder. Kluk also reports, that in France the seeds were used to obtain starch and it was also mixed with bile and used as glue for early wallpaper. This glue was inedible for mice and insects which was a plus. Referring to French authors, Kluk provides a recipe for a flour made of seeds (after the latter were soaked and rinsed), which was used to bake bread in times of food shortage. The seeds were also used in medicine boiled with alum which provided a relief against worms. Coughing and short-winded horses were given fodder with ground chestnut seeds.
The fleshy outer parts of the chestnut fruit when burned provided black dye. The bark of the chestnut boiled with alum gave a brown-yellow dye used for dyeing thread and wool.

**Folk tradition**

Chestnut trees, being around Polish landscapes only a relatively short time, have not yet truly settled in folk culture. The branches have been sometimes used to adorn village houses for the Pentecost (the Ascension of the Holy Spirit) holiday (fig. 1). In some regions of Poland there was a superstition that a chestnut tree should not be planted, because, when it has to be cut down, the whole family will die out (Niebrzegowska 2000: 130).

**The chestnut in poetry, painting and architecture**

In poetry, the chestnut appear rarely, generally as an element of the urban or garden landscape. One example can be found in the poem *Kraków* by Maria Pawlikowska-Jasnorzewska (1891-1945), written during wartime emigration when she was full of longing for her home town. The poet remembers the chestnut trees growing at the foot of the Wawel Castle (Pawlikowska-Jasnorzewska 2003: 354, first published 1942):

> Castle, my legend, do you remember me?  
> And you - the ring of chestnut trees  
> indomitably flowering  
> For as long as the third spring?  

In another poem, full of nostalgia, entitled *Liście krakowskie* [Cracow leaves], the author recalls the leaves of trees growing in Cracow (Pawlikowska-Jasnorzewska 2003: 364, first published 1943):

> Leaves, chestnut leaves!  
> Eternity should not take  
> Such a toll on me.

At the end of the 19th and the beginning of the 20th century, the chestnut became a popular theme among the painters and architects of the Polish Art Nouveau period, with the enormous aesthetic value of beautiful white inflorescences, original prickly fruits and large palmate leaves (fig. 2). The representations of horse chestnuts are numerous both in painting, architecture and applied art. The horse chestnut won a particular favour from the most accomplished creator of the Polish Art Nouveau, Stanisław Wyspiański (1869-1907), painter, poet, playwright and designer of stained-glass, as well as interiors and furniture. One of his most famous works of applied art is the handrail on the stairs in the building owned by the Polish Association of Physicians, depicting chestnut leaves and fruits shaped with great finesse, made of metal (fig. 3). Drawings and paintings showing the flowers and fruits of the horse chestnut, painted by Wyspiański and other artists, has also survived. In the period of Art Nouveau, there were architects working in Cracow who utilised the plant
motifs patterned on wild or cultivated species occurring in Poland. The horse chestnut was one of these plants - its stylized flowers, fruits and leaves can still be admired on the façades of some present day houses (Makowska 2008; Makowska and Kmiec 2004) (fig. 4).

**Current uses of the horse chestnut in Poland**

At present, the horse chestnut is one of the planted ornamental trees in the Polish landscape, being planted in parks and along roads. After World War II, the fruits of the horse chestnut were used to produce office glue and special collection centres were organised in order to gather sufficient quantities of this raw material.

In Polish, the word “kasztany” [chestnuts] means the seed of two different plants: the horse chestnut (*Aesculus hippocastanum*) and the chestnut or sweet chestnut (*Castanea sativa*). This is confusing, the more so, as most residents of Poland have not had any experience of sweet chestnuts. The colour of the fruit skin is described by the adjective “kasztanowy” [chestnut-brown], often used to refer to hair colour and another word “kasztan”, which means also the coat colour (nut-brown or dark brown ) of a horse [chestnut horse].

In autumn, the large smooth and shiny seeds of the horse chestnut are often used by children as playthings, by making little figures of humans or animals by joining horse chestnut fruits with matchsticks. Nowadays, when people are looking for natural remedies against harmful effects of civilisation, the horse chestnut fruits assume an important role. Many people believe that they eliminate harmful radiation, so they place the fruits near computer and TV-set screens, whilst some carry chestnut fruits around in their pockets (particularly in autumn). Other people believe that horse chestnut fruits prevent the ill effects of so called ‘water veins’ flowing beneath buildings, which purportedly adversely affect the health of residents. And, generally, the time when horse chestnut trees blossom (May) is universally associated with the sitting of final exam in upper secondary schools.

The uses of horse chestnut in medicine include its seeds (Semen Hippocastani), bark (Cortex Hippocastani), flowers (Flos Hippocastani), immature fruits (Fructus Hippocastani immaturus) and, more rarely – leaves (Folium Hippocastani). The most important curative substances isolated from the horse chestnut are aescin and aesculin, which have a sealing effect on veins, as well as anti-inflammatory and anti-oedematous effects. These substances are applied in various medicines, herbal mixtures, extracts and ointments.

In the cosmetic industry, the seeds of the horse chestnut are used in producing shampoos (owing to the high content of saponins), creams, hygiene products and in the chemical industry to produce glue (Ozarowski and Jaroniewski 1987; Strzelecka and Kowalski 2000).

Despite the widespread presence of the horse chestnut in Poland, its wood is not widely used, because it is soft and splits easily, has low durability and is subject to decay by fungi and damage from insects. It is only occasionally used as a material in carpentry and may be used for woodcarvings.

It is, however, commonly planted as an ornamental tree (many ornamental varieties and hybrids) in single-species avenues and in rows along roads and in parks.
Unfortunately, the ornamental value of the horse chestnut has been undermined relatively recently, by a widespread outbreak of the butterfly *Cameraria ohridella*, whose leaf-mining larvae cause a rapid drying of leaves and reduce the viability of these trees.

**Cannabis sativa**

Cannabis or hemp (*Cannabis sativa* L.), originating from Central Asia, have commonly been cultivated in Poland since the Middle Ages. Nowadays, their significance as a fibre and oil-providing plant has diminished, whereas interest in it as a plant containing narcotics has soared. For this reason, the cultivation of them is limited and subject to strict control. The hemp seed, pure or mixed, are used as fodder for domestic birds.

**Palaeobotanical data**

The use of hemp spread across Asia and then reached Europe with Scythian tribes, which used it as a narcotic (Körber-Grohne 1988). In Poland, macro-remnants of *C. sativa* were described from sites in Cracow (La Tène and early Roman period) (Wielowiejski 1981), Cracow-Mogila (a site of the Puchov culture - Roman period) and Wissembourg (Western Balt cultural circle - Roman period) (Lityńska-Zając 1997b), although widespread cultivation in Poland is noted only in mediaeval times (the 10th century) as in the Czech and Slovak lands (Wasylikowa *et al.* 1991).

The pollen grains of *Cannabis sativa* are very similar to the pollen grains of *Humulus lupulus* (grains with three pores). Identifying the pollen grains of *Cannabis sativa* (i.e. differentiating them from the grains of *Humulus lupulus*) is based, above all, on the extension of the pores (in *Cannabis* they are more extended) and, additionally, on the differences in pollen grain size and the thickness of their walls (the pollen grains of *Cannabis* are larger) (Godwin 1967; French and Moore 1986). In Europe, a marked increase in the proportion of the pollen grains of *C. sativa* in pollen diagrammes, took place in the Roman period, although single pollen grains are also noted in earlier diagrammes.

In the pollen diagramme from the Gościąż lake, the pollen grains of *Cannabis*-type begin to appear sporadically from the late phase of the Lusatian culture (2700 cal BP = 2500 14C BP); it is an exceptionally early finding and it may be associated with the occurrence of atypical pollen grains of *Humulus*. The first reliable occurrence of *Cannabis* pollen took place in the Roman period and, after an interruption associated with the migration period, the pollen grains of *Cannabis* have been permanently recorded in the settlement (Ralska-Jasiewiczowa and van Geel 1998).

On the island of Wolin, pollen grains of *Cannabis* were found in small quantities in the pre-Roman period (Latałowa 1992).

**Hemp in old Polish botanical literature**

The Old Polish words “konop” and the form “konopie” which has been used till now, appear in the mediaeval manuscripts on pharmacy and medicine (chiefly in the 15th century) (Rostafiński 1900: 145-146). The description has been found in herbals published in the 16th century and at the beginning of the 17th century. Falimirz writes that the fibres of hemp were used to make ropes and that the juice squeezed from seeds relieves earache, but causes a “drying of male semen” and induces headaches. The juice obtained from whole plants was used as a pain reliever. A soup was also made from hemp, but Falimirz warns that it is indigestible because it “expels winds from your bowels” (Falimirz 1534: leaf 32-33, Capitulum 45) (fig. 5). Siennik states that the hemp seeds are difficult to digest, whereas the soup made of hemp “is beneficial for the head” (Siennik 1568: 41). According to Marcin of Urzędów, hemp was very popular in Poland, but he warned against their harmful properties, addressing particularly women who cook hemp soup as a remedy against many ailments (particularly headaches). In quoting Dioscorides, he recommended the juice from whole plant as a remedy.
He further quotes Italian authors as saying that hens fed with hemp seed, lay eggs throughout the entire winter (Marcin Urzędów 1595: 69-70, Cap. LXXVII).

Syreniusz devotes two chapters to hemp (Syrennius 1613: III/107, 822-824; III/108, 824). He points out that it is a commonly known plant, widely used to cure humans and animals, as well as in everyday life. Hemp was an important plant providing fiber and oil: its stems were used to produce ropes and threads and seeds were pressed for oil. It was believed that the juice from fresh plants relieve earache (but causes headache) whereas crushed leaves heal burns. The hemp was administered to animals as a medicine against worms and to stop diarrhea. Seeds were fed to hens to lay eggs throughout winter. Large specimens of hemp after being burned provided a kind of ‘charcoal’ used to produce gunpowder. Syreniusz devotes a great deal of attention to the narcotic effects of the hemp. He writes that the crushed leaves added to any drink get people drunk. The Turks concocted a special drink called ‘masłok’ from hemp flowers to be given to their soldiers (particularly the janissaries). Its composition could be varied depending on purpose: as aphrodisiac, to produce cheerfulness, or to boost their courage while in battle. The author of the Herbal warns however that the hemp “cause madness” and destroy male semen.

Many hemp’s applications, described by Syreniusz survived till the 18th century which is reported by Kluk (1786, Vol. I: 98-100). He points out that hemp is used chiefly by peasants who make ropes and linen from it, which he recommends to bleach according to the recipe provided in the same book. The villagers commonly used the hemp oil, inter alia, to relieve pains. For stock animals leaves boiled in water were used against diarrhoea and worms. Kluk advises, following earlier authors, to feed hemp seed to poultry, because it works on birds as an aphrodisiac, thence birds “mate often’ and hens lay eggs. Similarly to Syreniusz, Kluk warns against the narcotic effect of the hemp. The whole plant - he writes - has unpleasant smell “particularly harmful to the head”. This warning is directed to villagers who drink oil and eat seeds ground to the milk-like consistency.

**Folk tradition**

The hemp has been used for many purposes by Polish villagers in the 19th and the first half of the 20th century, as a fibre plant, medicinal and edible plant.

**Material culture**

**Fibre plant**

The hemp has been cultivated foremost in order to obtain fibres. These were used to produce lines and ropes, but also canvasses, clothes, sacks, nets, or even carpets, tents, brushes, tarpaulins, harnesses and dressings. The fibre obtained from male individuals was softer, thence it was used for making fabrics; from female individuals – to produce ropes and lines (Wysakowska 2004: 58, 60). Even today, simple devices to make string or ropes can be found in villages (fig. 6). In the period of feudalism, peasants contributed a tribute or rent in the form of flax and hemp. The items produced in household workshops was destined principally to cover their own needs, but could also go to the domestic market and much less abroad. The ropes made of hemp have been also used for centuries in the mining industry, in the oldest European salt mine in Wieliczka near Cracow. Steel cables went into use only in the second half of the 19th century (cf. Skubisz [2008]).

The processing hemp (or flax) had several stages. First, the harvesting was always done manually, by uprooting plants. Male individuals were uprooted immediately after shedding blossom, female individuals – after fruit setting. The hemp was not scythed perhaps it was the reason that the harvest was work for women (Pieciukiewicz 1968: 8-9, 17). The male individuals, as less lignified were retted (i.e. exposed alternatively to sun and then to rain or dew) without soaking, the female plants were soaked in water for several days. Seeds were threshed from female individuals using flail, rod or a wooden comb. The next stage was drying, usually inside bread oven or on top of it. When the field work was completed the next stage was to process the harvested hemp by breaking stems, scuthing and hackling, during which scuth was removed from broken stems leaving only fibres. By-products were either used as fuel or processed into paper, construction boards; oakum (i.e. short hemp fibres) were used to fill mattresses or to isolate buildings (Wysakowska 2004: 60-61). Depending on the stage of hackling phase fibre of different quality was obtained. The next stage involved spinning and
weaving, or stranding ropes. Horsehair was sometimes added to the ropes to strengthen them (Pieciukiewicz 1968: 17-27). The hemp was cultivated in gardens which were often sectioned-off fragments of the fields, near houses (Baranowski 1985: 152-168, after: Wajda and Bach 2006: 35). Like in case of other cultivated plants, sowing hemp was also associated with customs assuring good yield. When sowing, one should look at a forest for hemp to grow large and dense and the sower should have shoes on to prevent hemp from growing hairy (Siarkowski 1878-1879: 60). The sowing should be done either before sunrise, or at evening, the best if there was no moon on the sky (cf. Wysakowska 2004: 66-67).

Medicinal plant

The hemp in various forms (extract from flowers, ointment from flowers, smoke from burned seed, compress of seeds, extract or tincture made from seeds and various ointments) were used to relieve headache or toothache, to treat venereal diseases, digestive tract ailments and various dermatological conditions (cf. Wysakowska 2004: 64-65). The hemp in the form of oil made from seeds was used, inter alia, in case of erysipelas ‘when ‘rose’ was on the leg or hand’ such limb should be wrapped in the hemp and treat by smoke from burning hemp seeds (Bittner 1900: 770, after Szot-Radziszewska 2007: 92; Gustawicz 1882: 238).

Edible plant

Like the poppy, the hemp was served in some regions of Poland during the Christmas Eve’s supper. The hemp seeds (first boiled then mashed) were cooked to give siemieniatka, a not very tasty soup. «A bland, fast soup, although seasoned with onion, bay leaves and rye flour, is inedible to an average consumer. Local people, used to it, eat this soup with groats, peas or potato, although without much enthusiasm» (Bohdanowicz 1996: 57). It was to protect those who ate it from sore throat throughout the coming year. Another custom practised at the Christmas Eve was to prepare a pie made of nine different grains (rye, wheat, oat, barley, millet, flax, hemp seed, pea, poppy, broad bean, carrot or beet seed and the like) and giving it to cows to prevent witches from taking away their milk (Siarkowski 1885: 4). Also cooked were dumplings with hemp seed stuffing (Wesołowska 1970, after Wysakowska 2004: 60)

«The hemp is sown at the Kurpie region and broken seed is used as a peculiar delicacy. Young people and children carry hemp seeds in pocket and snack them with appetite» (Chętnik 1936: 90). The pressed hemp seeds provided also oil (Moszyński 1967: 274).

Spiritual culture

The hemp appeared chiefly in agrarian rites aimed at ensuring abundant crops (not only of the hemp) and in rites to ensure health - through burning seeds or fibers, wrapping the ailing parts of the body, or scattering over a sick person. These were means of protection but negative effects were also ascribed to them. In some regions the process of soaking flax was hedged with prohibitions because of poisonous smell and poisoning water. In north-eastern part of Poland in the sphere of Belarusian culture, there was an Easter ceremony during which special songs called ‘konopielki’ (Polish for ‘hemp-songs’) were sang (Wysakowska 2004: 66-70). On the Shrove Tuesday or Pancake Day (the last day of carnival) after midnight there was drinking and dancing for the abundant yield of flax and hemp and a woman who jumped higher could expect taller hemp plants (Niebrzegowska 2000: 232). The housewives devoted their dance to the flax and hemp, while girls for the high crop of the rue (plant associated with matrimonial customs), while peasants – for the high cereal crop. In the Kielce region this custom disappeared around 1868, as a result of opposition from the clergy (Siarkowski 1878-1979: 60).

Hemp in poetry

Adam Mickiewicz (1798-1855), the famous poet of the Polish Romanticism period, repeatedly mentions the hemp in his poem Pan Tadeusz (1834) (Hryniewiecki 1956; Kmiec 2002; Literatura polska 1985, T. 1, 663-665). At the beginning of the 19th century the hemp was indeed an important element of the landscape. The hemp was planted in the fields and gardens among vegetables. It was highly valued not only as useful plant but also because its potent smell deterred pests (Mickiewicz 1957: 51):

Each bed is girdled with a furrowed border,
Where hemp-plants stand on guard in serried order,
Like cypresses, all silent, green and tall.
Between their leaves so serpent dares to crawl,
And their strong smell serves to defend the bed.

(Book II, 413-418)²

The dense patches of the hemp provided hiding to animals and sometimes also to people which is again described by Mickiewicz (Mickiewicz 1957:164):

And leapt into the hemp across the rail,
Within this crop, so fragrant, green and dense,
Both man and beast may find a sure defence.
Surprised among the cabbages the hare,
Leaps in the hemp to find a refuge there.
The stubborn stalks the greyhound’s course prevent,
The odour puts the foxhound off the scent.
Here to avoid the lash the servant waits
In hiding, till his master’s rage abates.
Here runaway recruits find a retreat,
While in the neighbouring woods the searchers beat.

(Book VI, 308-318)
The hemp in the Polish language

There are numerous sayings associated with the hemp, some present in contemporary language, or some which are no longer in use:
- Wyrwać się niczym (filip) Filip z konopi: to say something stupid or outside of the current topic of conversation;
- Na szlachcica żelazo, na chłopa konopie: «Iron for the noble, hemp for the peasant», the death penalty by hanging was symbolised by hemp used to make ropes, whereas the nobles were beheaded with sword;
- «Hulać na konopie»: drink in a tavern on Shrove Tuesday in order to have a high hemp yield (cf. women jumping follows the same custom).

Current uses of hemp in Poland

The fiber hemp may be cultivated solely for the needs of the textile, chemical, paper and pulp, food, cosmetic, construction materials industries, as well as sowing seeds production. In Poland, the growing, for own use, of both poppy (even the low-morphine variety) and hemp is prohibited (Articles 45 through 52 of the Act on preventing drug addiction, of 29 July 2005, promulgated in Journal of Laws of 19 September 2005, No. 179 item. 1485).

At present, hemp is a plant which is present in the public consciousness in Poland, particularly young people, because of the narcotic properties of the Indian hemp (Cannabis sativa subsp. indica), which is a species related to the hemp or cannabis grown in Poland. The images of hemp leaves can be found on clothing, bags and badges. Although possessing hemp is illegal, the pipes to smoke marijuana can be easily purchased. The Indian hemp is so deeply rooted in the youth culture, that it is one of the trademarks of its ‘counter-culture’ rebellious aspects. The Internet also has many websites devoted to the cultivation of the Indian hemp, the methods of its processing and how to smoke it. In blogs and Internet forums, people comment on it with an excitement and commitment, which signifies the persistent fashion and ‘culture-setting’ impact of marijuana. Probably, knowledge of the hemp and in particular the species deemed to be more ‘domestic’ and loaded with a great deal of superstitions and customs, is more limited, among the visitors to the above-mentioned websites. Hence, it can be said, of course figuratively, that it is an example of an ‘invasive’ plant in our culture, supplanting the domestic species in terms of social mentality and awareness.

Fagopyrum esculentum

In Poland, common buckwheat or buckwheat (Fagopyrum esculentum Moench) is one of the more edible species, which are often cultivated. Groats produced from its seed is a very popular and favoured dish. Also, the flour made from it is used in Polish cuisine. The emergence of this plant in Poland is often associated with Tartar incursions in the Middle Ages (hence the name of the related species - Tartary buckwheat Fagopyrum tataricum (L.) Gaertn., is sometimes used to include common buckwheat as well).

Palaeobotanical data

The place of domestication of the common buckwheat is deemed to be in Manchuria and central Siberia, in the Himalayan Mts, China and India. It is assumed, that common buckwheat evolved from a wild form occurring in Yunnan province in southern China, namely F. esculentum subsp. ancestrale Ohnishi (Hanelt 2001).

The wild form of Tartary buckwheat is the subspecies F. tataricum subsp. potaninii (Batalin) Ohnishi, occurring in natural localities in Tibet, Sichuan, Kashmir and northern Pakistan (Hanelt 2001). Tartary buckwheat is sometimes treated as a semi-domesticated species, as its fruits fall off easily and do not germinate at the same time. Tartary buckwheat often occur as a weed infesting the fields of common buckwheat, although it reached Europe as a weed only in the 18th century (Hanelt 2001; after Litynska-Zajac, Wasylikowa 2005: 111).

The pollen grain of Fagopyrum is large (45-60 μm) and characteristic for its morphological structure which is trizonocolporate, i.e. the grains have three furrows with pores in them (Moor i in. 1991). The pollen grains of Fagopyrum have been found in sediments dating from the Sub-Atlantic period, i.e. roughly from the beginning of the Iron Age. Most probably, this earlier appearance of Fagopyrum pollen grains could be linked with the emergence of other forms of buckwheat found in natural locations, before later occurring as a weed. It is only from around the 12th-13th centuries onwards, that an increased proportion of buckwheat pollen grains was found in the sediments, as a result of its more widespread cultivation (Litynska-Zajac and Wasylikowa 2005).

Cultivation of the buckwheat in Europe is most often linked to incursions by Tartars in the 13th century. In the south of Ukraine, in the Azov Sea region, common buckwheat was known to the Scythians as early as ca. 2500 years ago. It is believed that the buckwheat could be subject to trade between the East and ancient Europe. The buckwheat reached Poland ahead of the Tartar invasions, which is indeed confirmed by the presence of fruits in sediments dating from the 9th century, on the island of Wolin (Alslabon 1995). Pollen grains of buckwheat have also been identified as dating from the 11th/12th century in Wawel Castle and in 11th through 15th century layers beneath the Main Market Square in Cracow (Wasylikowa 1978; Wieserowa 1979). The plant
also earlier reached (in the 10th century), the areas situated to the south and west of Poland - i.e. the territories of the Czech Republic, Slovakia and Hungary, whereas it had entered Holland earlier, in the 7th century (Badura 1999a).

**Buckwheat in old Polish botanical literature**

The Polish names “tatarek”, “tataczane krupy” [Tartar groats] first appeared in the mediaeval pharmaceutical and medical manuscripts (mainly in the 15th century) (Rostafiński 1900: 155). Syreniusz writes (Syrenius 1613: 1004-1005, IV/31), that in the old times, the (Tartar) buckwheat was sowed as a fodder plant for stock animals, but at present (the 15th century) also people eat it in the form of groats-coarse for farm servants and very fine (“as little pearls”) for the tables of nobility and royalty (fig. 7). Flour was obtained from it, used for baking bread when there were food shortages and for preparing gruels for babies. It was also valued as animal fodder (fig. 7). In the 18th century, the use of buckwheat groats as food continued and the flour mixed with wheat flour was used to make bread (Kluk 1787: 213-214). The buckwheat malt was used for brewing beer. Other applications included its use as a green manure, cattle fodder and as a melliferous plant. Eggs for winter time were kept in buckwheat chaff and bran.

**Folk tradition**

**Material culture**

**Edible plant**

In old times, bread or other breadstuff was made from buckwheat (either alone or with the addition of rye), such bread could still be seen around the years 1890-1900 (Chętnik 1936:54). The buckwheat breadstuff called “gryczany” or “grycany” was not greatly valued because it crumbled after a couple of days. During bread baking sometimes pancakes made of potatoes and buckwheat flour were also baked (on leaves) (Gawel 1993: 66-67). In the Kielce region, the name of “tatarczuchy” was given to bread loaves or pancakes made from Tartary buckwheat and offered to guests on family occasions, but also given to old beggars on the All Souls’ Day (Siarkowski 1893: 78-79). *Pierogi* - dumplings (made of wheat flour with yeast) stuffed with buckwheat groats were also baked (south-Lublin region) (Bohdanowicz 1996:43). Another dish was made of cabbage leaves stuffed with groats (*gołąbki*) (e.g. with buckwheat groats), in south-eastern and central Poland (Bohdanowicz 1996: 45). «Fifty years ago the regular food included: buckwheat groats, buckwheat bread, potatoes and peas» (Chętnik 1936: 74).

Still, at the end of the 19th century, groats were key components of a peasants’ diet. Nowadays, their consumption has decreased markedly, but in some regions it is still a traditional dish for the Christmas Eve supper (Bohdanowicz 1996: 52).

In the Polish-Ukrainian border areas, the buckwheat groats were served at the Christmas Eve supper (with mushrooms, fruits, poppies, compote or siemieniatka soup). It was much less common at wedding feasts – but in the Polish-Ruthenian borderlands it was served with milk or in dumplings (in Lublin region) and in other regions was added to meats and sauces (Bohdanowicz 1996: 53). In the Podlasie and Lublin regions, noodles made with buckwheat flour were served on Christmas Eve (Bohdanowicz 1996: 54). Sometimes, *kisiel* (a kind of gelatinous dessert) was made from coarse oat flour and more rarely from buckwheat flour [in the areas around Brest (Brześć)] (Bohdanowicz 1996: 42).

**Spiritual culture**

The buckwheat should not be sown ‘at two lights’ i.e. when both the sun and moon are on the sky; it should be sown when the sky was covered by white clouds.

---

**EC4.** *Zielnik* by Sz. Syreniusz. Cracow 1613. Figure 7 - illustration of *Fagopyrum esculentum* from Zielnik (The herbal)
There were also sayings associated with the buckwheat:

– «Hreczkę siać i pacierze mówić; siać hreczkę; siać grykę» - literally: «to sow buckwheat and say one’s prayers; to sow buckwheat» to work the land - a kind of negative statement, said with disrespect;

**Current uses of the buckwheat in Poland**

In Poland, the buckwheat is still a popular edible plant. The buckwheat groats are still an item of Polish cuisine, especially in its regional varieties. Additionally, the inexpensive bar outlets, subsidised by the state, have always used buckwheat groats with butter or sauce, as a separate although very simple dish on a menu. Other products made with buckwheat flour such as pasta are becoming increasingly popular, behind the drive towards vegetarianism and the ideology of a healthy diet. However, the pancakes, or French-fashion crepes achieved more success than the dishes following native Polish recipes.
The buckwheat is often cultivated as an early removing forecrop, because it leaves a field weed-free. It is also a valuable melliferous plant – a honey based on its nectar has a characteristic distinct taste and aroma, as well as a dark-brown colour. Buckwheat honey is now a regular product on the market and continues to be used to make mead – an alcoholic beverage characteristic for Central and Eastern Europe.

In medicine, the buckwheat herb (Herba Fagopyri) is used, as a source of rutin, an agent which seals the walls of blood vessels and a component of many herbal preparations. The seeds of the buckwheat are also used in a gluten free diet (Strzelecka and Kowalski 2000).

**Helianthus annuus**

Sunflower (Helianthus annuus L.) originates from North America. It emerged in Poland very shortly after being imported to Europe (the 16th century) as an ornamental plant and this purpose is still very important.

**The sunflower in old Polish botanical literature**

The first Polish author to provide some information on the sunflower was Szymon Syreniusz (Syrennius 1613: 1527 [1531]-1528[1532], V/209). He wrote that the sunflower originates from where it was brought to Europe to be grown in gardens. In 16th century Poland, it was little known, as Syreniusz reports that he had seen it in the garden of the Kazimierz starost, Mikołaj Firlej in Bejsce, and that «here, it has difficulty surviving in these cold lands». He added also, that the sunflower was cultivated as an edible plant «they make a dish of it which is more tasty than artichoke and asparagus, with young leaves with hairs shaven removed, baked with salt, olive and black pepper on a gridiron». Seeds were also eaten as well as boiled inflorescences which were regarded as an aphrodisiac «strengthens vigor of a man». For medical purposes the whole plant was boiled «in order to remove stones». The sunflower was also believed to by a magic plant – a piece of its root worn around the neck was believed to protect against sudden death. These bits of information are partly quotes by Syreniusz from Western authors, e.g. R. Dodonaeus. He also writes «With time, the true effect of the sunflower could be learned when you live longer among the people». In the 18th century, the sunflower became more known and used as an edible and melliferous plant. Young stems, as well as the floral disc, were compared to artichokes. Seeds were use to press oil and as a feed for poultry (Kluk 1787: 36).

**The sunflower in poetry and painting**

The sunflower is mentioned in a Romantic poem Pan Tadeusz (1834) by Adam Mickiewicz, in the description of a garden around a nobleman’s manor house (Mickiewicz 1957:51):

> And like the moon amid the starry maze  
> With flaming countenance the round sunflower  
> Pursues the westering sun from hour to hour.  
>
> (Book II, 424-426)

In the poem **Słonecznik** [Sunflower] by Maria Pawlikowska-Jasnorzewska (1891-1945), the flower is compared to the sun (Pawlikowska-Jasnorzewska 2003:242-243, first published 1935):

> You are much in the know  
> On a level to which we wish to go  
> Flower, modelled on the Sun […]  
> Wild, spicy puff  
> Shrouds you in a webby stuff:  
> May be it is the Sun’s smell  
> That you can feel and tell?  
>

In the 20th century, the sunflower became a popular ornamental plant in rural gardens and was soon perceived as a ‘typical Polish” plant. Its images can be found on many paintings depicting both whole plants growing in gardens, as well as flowers in a vase and they symbolised the full ‘mature’ summer (figs 8, 9). The sunflower appears as ornamental motif in art-nouveau tenement houses in Cracow. Sometimes it is a constituent of flower compositions adorning churches, during the holiday of Our Lady of the Herbs (15 August).

**Current uses of the sunflower in Poland**

At present, the sunflower is a popular ornamental plant grown in many gardens. Apart from this it is cultivated for its seeds which are used as bird fodder. Only lately have some attempts been made to cultivate some oil-producing varieties of the sunflower, but it is feasible only in the warmest regions of the country.

The shelled seeds of the sunflower are very popular throughout Poland and may be found in bakery products, breakfast cereals and sweet bars. Near the eastern border of Poland, the sunflower harvest purchased by petty traders from Ukraine and Belarus is immensely popular. The shelled fruits of sunflowers, so-called “pestki” (roasted or not) are liked in eastern Poland (an influence from the East). Particularly at schools, at sport facilities, bus stops or in cinemas, there will be many persons eating sunflower “pestki”. Perhaps because of the rural and traditional connotations, the motif of sunflower is utilised by producers and advertisers, whenever there is a need to show a homely, rustic atmosphere and suggest the ‘naturalness’ of the product.
Iris

There are three species of irises occurring naturally in Poland: the stool iris (Iris aphylla L.), a very rare component of xerothermic swards, Siberian iris (I. sibirica L.) that is fairly common in moist meadows and the yellow iris (I. pseudacorus L.), common on water bodies. The fourth species, the grass (grass-leaved) iris (I. graminea L.) once occurring in southern Poland in the grassland communities, is now considered extinct (Kaźmierczakowa and Zarzycki 2001). Occurring for a long time and partly naturalised is the German (bearded) iris (I. germanica L.), an ornamental and medicinal plant. At present there is an enormous number of cultivated iris varieties, derived from both native and alien species alike.

The iris in old Polish botanical literature

The Old Polish names of “kosaciec” and “fiżolkowy korzeń” for irises appear in mediaeval manuscripts on pharmacy and medicine (mainly in the 15th century) (Rostafiński 1900: 128-129). They referred to Iris germanica and Iris florentina (violet root), used interchangeably for curative and cosmetic purposes.

In the first book on plants printed in Poland, namely De herbarum virtutibus (1532) by Aemilius Macer (Macer Floridus) 4, written in Latin rhymes and containing the Polish names of plants added by the Polish physician Simon of Lovicz [Szymon z Łowicza] (ca. 1512-1538), one of the chapters is devoted to the iris. The author mentioned that the name referred to the colours of its flowers which resemble a rainbow (Macer 1532: leaf 38-39). At that time, the rhizome of an iris was used in medicine as a cough reliever, soporific (sleep-producing) agent, stimulant of menstruation (powder of dry rhizome drank with wine), soothing colics (powder mixed with vinegar), for curing skin conditions (boiled rhizome), healing wounds (powder mixed with honey) and improving complexion (iris powder mixed with powder from the false hellebore Veratr um sp. mixed with honey).

Stefan Falimirz includes two chapters describing irises (Falimirz 1534: leaf 66 [67], Capitulum 105; leaf 69, Capitulum 109). He recommended the medicinal use of the rhizome which should be gathered in spring, cut into slices and dried. Further medicinal uses reported for the Iris germanica (and other species with similar properties but with flowers of different colours) were thought to have diuretic properties, prevent “clogging of the liver and spleen”, relieve pains in the lungs, stomach and other viscera, be beneficial in treating old wounds and serve as an anti-aphrodisiac (“stop the flow of semen”) when powdered rhizome is applied, as well as being effective against paralysis (oil from rhizomes) and headaches (oil from rhizomes mixed with rose oil and vinegar). The extract from the rhizome mixed with other plants was applied for cosmetic purposes to improve one’s complexion. Similarly used was Iris florentina – to relieve coughs, to treat the spleen (the rhizome boiled in vinegar), heal old wounds, to stimulate menstruation, to relieve stomach ache, as a diuretic, against paralysis, for removing a dead foetus (the rhizome was boiled in wine), as well for cosmetic purposes and for mouth rinsing. Falimirz included a separate recipe for vodka made from the rhizome of the iris, deemed effective against a number of ailments (Falimirz 1534: “O wodkach”: leaf 6).

Marcin of Urzędów [Marcin z Urzędowa] lists a number of medicinal uses of the iris rhizome, inter alia against hernia, hip pains, as a diuretic and as the treatment for head wounds, as well as cleansing the spleen. He criticises a Pliny’s superstition, according to whom the root had to be dug with the left hand and someone digging it, should say aloud the purpose for which he intends to use it (Marcin Urzędów 1595: 177).

Syreniusz listed more than a dozen iris species, mentioning that the best in terms of medicinal uses are the “garden iris” (Iris germanica) and the “violet root” (I. florentina). He recommended various medicinal products made of iris rhizome: powder with honey, extract, “cakes” with sugar and other additives sold in pharmacies as “diaris” and plasters made of crushed rhizome. He also provided a number of various recipes of herbal medicines containing iris components, e.g. “confect” (herbal mixture with honey) and oils obtained from the rhizome or flowers. Syreniusz listed a number of medicinal uses of iris, including relieving coughs (boiled with wine, honey or sugar), fighting pains in the stomach, as an antidote against bites by poisonous animals (powder mixed with hot vinegar), for liver and spleen ailments (iris with honey-vinegar), an anti-aphrodisiac – “against flowing male semen”, for stimulating menstruation, for treating old wounds, head sores, throat inflammations, treatment against worms and as a diuretic (Syrennius 1613: 1-17, I/1). The iris was also used for cosmetic purposes – to improve the complexion, for rinsing one’s mouth and as a kind of deodorant (little bags with ground rhizome were worn in the armpits). Syreniusz described also some superstitions concerning the iris. It was believed that carrying the rhizome alone, especially when directly on the body, protects one against cramps and bleeding, while chewing the rhizome raw prevented drunkenness. Children, especially when teething, were given pieces of iris rhizome to wear round their necks to ward off diseases.
In the 18th century, the use of the iris had diminished. Kluk refers only to the application of the iris rhizomes as a cough-reliever, diuretic and a pain-reliever. The flowers of *Iris germanica* soaked in water and allowed to rot, provided green paint. Irises were also grown in gardens as ornamental plants (Kluk 1787: 59-60).

**The Iris in poetry and painting**

Beautiful iris flowers, whose colours remind us of all the hues of the rainbow, have inspired artists, particularly poets and painters. A poem by Edmund Bieder (1877-1937) entitled *Irises*, could be given as an example (Sikora 1986: 135):

> In the mystical garden of our soul
> Pale blue irises tremble before the sun’s caress whole
> They dream of solar dust... they dream
> For the rainbow floods of a light beam [...] 

The shapes of iris flowers, sophisticated and fine, were very popular during the Art Nouveau period, when the iris became a frequent model of painting, sculpture (fig. 10) and drawing from nature, as well as a motif used in applied art.

**Current uses of Irises**

Apart from the widespread growing of irises as ornamental plants, they are still used as a raw material for the pharmaceutical industry (primarily the German (or bearded) iris *Iris germanica*). The rhizome of the iris (so-called violet root, Rhizaoma Iridis) is used for herbal preparations and mixtures applied as expectorants, diuretics and cholagogues. The oil extract from the rhizome is used in the perfume industry. Similar uses are made of the rhizomes of the Florentine iris (*I. florentina*) and sweet iris (*I. pallida*).

**Notes**

We would like to thank Mr. Marek Grabski and Mr. Marian Długosz (Ethnographical Museum in Cracow) for help in collecting illustrations.

1 Excerpts from poetry by Maria Pawlikowska-Jasnorzewska, and Edmund Bieder translated for this paper by Roman Tertil (2009).


3 Zielnik [The Herbal] by Syrennius has been edited at the end of the 16th century, published in 1613.


**References**


Baranowski 1985: B. Baranowski - Gospodarstwo chłopskie i folwarczne we wschodniej Wielkopolsce w XVIII w [Peasant’s and manor’s farm in the east Wielkopolska in the 18th century], Warszawa, PWN, 1985, 265 p.


Falimirz 1534: S. Falimirz - O ziołach y o moczy gich [On herbs and their power], Kraków, Florian Ungler, 1534, 70 p, unnumbered + 1 + 1+ leaves 156 + 23 + 42 + 59 + 119.

French and Moore 1986: C.N. French and P.D. Moore -
Deforestation, Cannabis cultivation and Schwingmoor formation at Cors Llyn (Llyn Mire), Central Wales, in New Phytologist, 102, 1986, p. 469-482.


Macer 1532: A. Macer - De herbarum virtutibus, cum veris figuris herbarum, Cracoviae, ex Officina Ungleriana, 1532, [Reprint] Warszawa, Wydawnictwo Artystyczne i Filmowe, 1979, 184 p. unnumbered (only 63 leaves numbered, with mistakes).


Marcin Urzędów 1595: Marcin z Urzędowej [Marcin of Urzędów] - Herbarz Polski [The Polish herbal], Kraków, w Drukarni Lazarzowskiej, 1595, 6 p. unnumbered + 488 + 2 unnumbered.


Pieciukiewicz 1968: M. Pieciukiewicz - Północnej: przewodnik [Traditional cultivation and processing of fibrous plants in northern Poland: a
guidebook], Toruń, Muzeum Etnograficzne w Toruniu, 1968, 40 p.


Rostafinski 1900: J. Rostafinski - Średniewieczna historya naturalna w Polsce [Medieval natural history in Poland], Część pierwsza [Part 1], Kraków, Nakładem Uniwersytetu, 1900, XXI + 605 p. + tabl. I-IV.


Siarkowski 1885: W. Siarkowski - Materyjały do etnografii ludu polskiego z okolic Pińczowa, Zbór Wiadomości do Antropologii Krajowej, T. 9 [Reference for ethnography of Polish folk people from Pińczów area], in W. Siarkowski - Materyjały do etnografii ludu polskiego z okolic Pińczowa [Reference for ethnography of Polish folk people from Pińczów area], Kielce 2000, Wydawnictwo Takt, p. (3-72) [original numbering of pages from the 19th century].

Siarkowski 1893: W. Siarkowski - Potrawy, ciasta i chleby ludowe w okolicach Kielc, Pińczowa i Jędrzejowa [Courses, cakes and baker's goods in Kielce, Pińczów, Jędrzejów surroundings], in W. Siarkowski - Materyjały do etnografii ludu polskiego z okolic Pińczowa [Reference for ethnography of Polish folk people from Pińczów area], Kielce 2000, Wydawnictwo Takt, p. 73-79 [original numbering of pages from the 19th century].

Siennik 1568: M. Siennik - Herbarz [The herbal], Kraków, M. Szarfenberg, 1568, p. 11 unnumbered, +632+102+2 unnumbered.


Syrennus 1613: S. Syrennus [Syrennus Sz.] - Zielnik [The herbal], Kraków, B. Skalski, 1613, 20 p. unnumbered +1540+24 unnumbered.


Szulczewski 1932: J. W. Szulczewski - Rośliny w mianownictwie, przesądach i lecznictwie ludu wielkopolskiego [Plants in names, superstitions and medicine of Wielkopolska folk], in Lud, 31, 1932, p. 93-10.


Wieserowa 1979: A. Wieserowa - Plant remains from Early and Late Middle Ages found in settlemens layers of the Main Market Square in Cracow, in Acta Palaeobotanica, 20, 1979, p. 137-212.