

Lech Komarnicki

INTERSPECIES AND INTERSERIES CROSSES
OF BEARDLESS IRISES

revised, completed and updated version

English translation edited by Mrs. Anne Blanco-White

to Evelyn, my wife

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ACKNOWLEDGEMENT

The text above would not be complete without few words of acknowledgement. I should not be able to write it if I had not read in the BIS Year Book more than twenty years ago a few articles written by Dr. Tomas Tamberg and later if I did not meet him and his charming wife, Christine, in their garden in Berlin. Tomas has helped me through the years with plants, seeds and advice. Some irises I registered were grown from seeds I received from him but Tomas was so generous that did not allow me to register them in his name. Thanks to him I could start about fifteen years ago in my own way. A few years ago I repeated a cross invented by him, tetraploid siberian x sibtosa, resulting in sibtosa 3 – 1, and the obtained plant seemed to me nice enough to be named in his honour.

'Fur Grossemeister' (sibtosa 3 - 1)



My special thanks go to Mrs. Anne Blanco-White who was so kind as to edit the translation and who sent me also some materials unknown to me and numerous valuable remarks which helped me to make amendments and to correct mistakes. Her help was really priceless.

Words of gratitude are sent to Mrs Jean G. Witt who gave me much important informations from her own research.

A FEW WORDS OF EXPLANATION

This work was originally a chapter of the big booklet written in Polish for Middle European Iris Society, entitled "THE BEARDLESS IRISES" ("IRYSY BEZBRÓDKOWE" - printed in 2011) and treating about plants for colder climate. Presenting to the British reader only one chapter from the booklet I ought to explain the adopted principles on which it is constructed.

From my point of view the interspecies and interseries beardless hybrids are the most interesting and unusual group of irises. The list of such hybrids is really long and with growing number of tetraploid clones, which are often fertile, is growing longer. New types of crossing are appearing and though the number of possibilities is not unlimited it is still not fully exploited.

As far as I know, there is not yet any list collecting the known types of wide crosses. Such list however may be useful for the hybridisers interested in beardless irises. The text below is an attempt to gather all the known and verified groups of these hybrids and to classify them according to botanical classification. Every group (with pedigree given) is discussed shortly under the mother species and reference is made to the male parent. I hope this classification is logical and clear and may help the reader to observe the actual situation and trends in breeding. The fertility is emphasised because it gives the chance of creating the breeding lines. Limits of space only allow some cultivars to be mentioned.

I omitted the interspecies hybrids in homogenous Series and Subseries, which include closely related species easily intercrossing, as Sibiricae, Chrysographes, Californicae and Hexagonae. Practically all cultivars in these groups are hybrids, sometimes crossed more than once. From the point of view of a breeder it is irrelevant. Any iris from the Californicae for example, whether a pure species, or a cultivar combining and recombining species in its pedigree, will behave in the same way when crossed with a similar one from (for instance) the Chrysographes Subseries. It is of course a simplification but for use in our work these Series and Subseries are treated as big species in the widest meaning of the word. So in the pedigrees reader will find names of Series and Subseries. This does not mean that hybrids of the species from such Series cannot or should not be registered in the garden category SPEC X. But for wide crosses any cultivar is a representative of the whole group. It is evident that individual differences may play a role. Some cultivars are easier to pollinate than other. Some are good parents, some are not. A breeder must base conclusions on his/her own experience.

Spuriae are not so homogenous, there are two different groups which probably are not compatible, but practically till now they were not successfully used for interseries crosses, though there are three cultivars registered. These however are doubtful and more would be said below. The fourth, unregistered, will be mentioned under the name gradissima. *I. ensata* makes a whole garden group known as Japanese irises and we appear to deal with one species.

All the rest reader will find below.

WIDE CROSSES OF BEARDLESS IRISES

GARDEN CATEGORY – SPECIES CROSSES (SPEC X)

British breeders pioneered in the field of interspecies crosses. Sir Michael Foster (professor of medicine, iris enthusiast and collector of species) worked at the end of the XIX century and generously shared his results and plants with other enthusiasts and breeders, inspiring W.R.Dykes whom he encouraged to work with irises. Then in the first quarter of the XX century the great breeder Amos Perry seems to have crossed all the species he had, mainly beardless, with each other for the first time. In 1927 his Iris 'Margot Holmes' (*I.chrysographes* x *I.douglasiana*) was the first recipient of The Dykes Medal. Then in the 1990s the A.I.S. established a medal – the highest award in this category. It was named the Randolph-Perry Medal as an acknowledgement of the great merits of the British breeder and the American botanist, explorer and iris expert L.F.Randolph.

In the '30s M. Simonet in France made some far crosses. In the second half of the XX century Dr. W. G. McGarvey crossed siberian irises (28 chromosomes) with sino-siberians (40 chromosomes). In the '70s in American gardens some attractive hybrids appeared from uncontrolled pollination which were later recognised and registered as cal-sibes. In the U.S.A. Lorena Reid tried some far crosses and in Germany Dr. Tomas Tamberg started his big scale work and obtained many unusual hybrids. He also converted many clones of species and hybrids to tetraploids and that opened new possibilities.

Development in breeding will cause a marked growth in numbers of hybrids and probably some bigger groups will be separated out and placed in separate categories, but that is for the distant future. For the present it is enough that a category of SPEC X exists and the best hybrids may aspire to awards.

According to the accepted principles explained in the introduction, the botanical classification will be followed going successively through the sections and series of Subgenus Limniris. The reader will find the names of particular types of hybrids under both parental species, but their description is under the female parents; these types of hybrids are usually named by combining the first syllables of the pod parent with the last syllables of the pollen parent.

SECTION LOPHIRIS

These irises are related to the bearded irises so it is no surprise that the hybrids of *I.tectorum* with the bearded diploid *I.pallida* are known. The information that a Japanese breeder obtained a hybrid between *I.tectorum* and a siberian iris was however very surprising and, according to H. Shimizu, not true.

Hybrids between the species from the Section Lophiris are not described here because they do not belong with the beardless irises in the true sense of the word and so are outside the frame of our booklet. Needless to say they cannot be grown in the Polish climate though to my surprise *I.japonica* has grown for more than ten years in the open ground in the microclimate of the Arboretum in Bolestraszyce (Southern Poland).

SECTION LIMNIRIS

Series Chinenses and Series Vernae

Nothing is known of hybrids. Probably there have been no attempts to cross irises from these series.

SERIES RUTHENICAE

I.ruthenica

Dr. Tomas Tamberg hybridised *I.ruthenica* with sino-siberians. The SIGNA Check List has no information about this. As far as I know nobody else has tried to cross these species.

Chrythenica – see under Subseries Chrysographes.

SERIES TRIPETALAE

I.hookeri

Until a few years ago *I.hookeri* was treated as a subspecies of *I.setosa*. The chromosome number is the same and the difference is in presence of one pigment absent in *I.setosa*, the shorter stem and only one or two buds. I was sure it was rarely used as the features mentioned are rather undesirable. Unexpectedly I found in the information sent to me by Mrs. Jean Witt that there are some crosses with siberians and during the work on this translation Mrs. Anne Blanco-White informed me about Tony Huber's quite sensational cross *I.hookeri* x 'Donau'. It seems that if *I.hookeri* reached the species status its hybrids should be listed here.

Hookbirica – (*I.hookeri* x *Sibiricae*) – two cultivars of this type were found in SIGNA Check List. Time will show if the similar crosses should be made.

Hookcorus – (*I.hookeri* x *I.pseudacorus* tetraploid) – nothing is known about this hybrid. It seems to me sensational as I made myself hundreds crosses with *I.pseudacorus* and *I.setosa* with no result. The more so that it is a cross of a diploid with a tetraploid. Let us wait for more details.

Hooktosa and setkeri – crosses between *I.hookeri* and *I.setosa* – it would be difficult to find them in Check Lists. The species are so closely related that hybrids (if there were any) are practically undistinguishable from pure *I.setosa* and so I do not list them in wide crosses.

Sibkeri – see under Subseries Sibiricae.

I.setosa

A valuable species often used by breeders. In far crosses it is mostly used as a pollen parent.

Sevigata – (*I.setosa* x *I.laevigata*) – Dr. Tomas Tamberg, of course, bred the first hybrid. Unfortunately he did not continue his work and did not obtain a tetraploid clone. Apart from a short description in the Check List there is no more information. A. Horinaka also obtained such hybrid, evidently from unreduced gamete of *I.setosa* (2n=53,54). He thinks the hybrid sterile form of *I.setosa* growing wild in Japan and known as *I.hondoensis*, sometimes treated as a subspecies, may in fact be a hybrid of the sevigata type, taking into account the similarity to his seedling.

Sibtocolor – see under Subseries Sibiricae

Sibtosa – see under Subseries Sibiricae

Tenosa – see under Series Californicae

Verbiritosa – see under *I.versicolor*

Vertosa – see under *I.versicolor*

I.tridentata is a southern species, rare in cultivation. The chromosome number is 2n=40 counted by Dr. N. Henderson. I thought there are no hybrids but in the last minute Dr. Tamberg informed me that Marty Schafer had obtained interesting hybrids from this species crossed with siberians and had sent him photos. Let us wait for more information. The name should be probably **sibtata**. Breeder will decide.

SERIES SIBIRICAE

SUBSERIES SIBIRICAE

Siberian irises

Practically all cultivars in this Subseries are in fact hybrids of *I.sibirica* and *I.sanguinea* sometimes later crossed with *I.typhifolia*. In breeding we treat them as one big species in the widest sense of the word.

Iris x aquatilis – (tetra Sibiricae x reversicolor) or (reversicolor x Sibiricae) – a new type of wide cross hybrids, combining three species: *Sibiricae*, *I.versicolor* and *I.ensata*. Vigorous plants, growing in water, with tall stems and flowers looking like siberians of rather modest type, sterile of course. Decorative leaves, light yellow in spring (first type) or white when the mother plant was reversicolor. The second type is tender and easily damaged by late frost, the first is completely hardy, May be useful as a water plant – a siberian growing in water may be attractive though surprising.



Aquatilis – leaves in early spring



aquatilis -flower

Sibcolor – (tetra Sibiricae x *I.versicolor*) - group of hybrids attracted growing interest from breeders. Hybrids of this type appeared spontaneously in two German gardens in the '80s of the last century and certainly may appear in any garden where tetraploid siberians grow along with *I.versicolor*. The first cultivar of the type called 'Neidenstein' was registered in 1985 by A. Winklemann. In 1992 the same breeder registered three other cultivars from open pollination of the first one and the first cultivar of the type sibcolor $\frac{3}{4}$ – $\frac{1}{4}$ from tetra siberian pollinated by 'Neidenstein'. Around 2000 some seedlings of the sibcolor type, again from open pollination, bloomed in the garden of Mary Betts in the US. Two of them were registered. Ms Betts crossed them later with *I.versicolor* obtaining sibcolor $\frac{1}{4}$ – $\frac{3}{4}$. One seedling turned out to be fertile.

In the '90s sibcolors caught the attention of Dr. Tamberg who thought that this line of breeding had great possibilities. He registered two cultivars – 'Berlin Network' (2000) and 'Tango Music' (2006). Two sibcolors intercrossed gave seedlings which did not satisfy the breeder.

My first attempts were made in 2000 and from one cross I received a small row of very good seedlings with red wine coloured flowers in different tones. Two of them were registered. Lack of pollen and low fertility unfortunately made the backcross to siberians impossible and I obtained only hybrids $\frac{1}{4}$ – $\frac{3}{4}$.

Sibcolors may be fertile, but the fertility is rather limited. Plants are vigorous and grow quickly. A characteristic feature is that leaves in spring are light yellow becoming green before flowering time. The possibility of obtaining different colours seems good though the results are not always satisfactory. Some seedlings are beyond expectations. Flowers are big, in form like siberians with about seven buds on a stem and in my garden they grow in an artificial bog.

Hybrids $\frac{1}{4}$ – $\frac{3}{4}$ are also very vigorous but have smaller flowers and, in my case at least, are not so nice with shorter stems. They grow very well in shallow water and may be useful for ponds. My seedlings are sterile.

Sibcolor 'Wojewoda' ('Voivode')



Sibcorus - (tetraploid Sibiricae x *I.pseudacorus* tetraploid) - hybrids of Sibiricae x *I.pseudacorus* were mentioned earlier in some other publications, the tetraploid version using 'Donau' as a pollen partner is probably new. A hardy, tall plant with yellow leaves in spring, a tall stem crowned with flowers reminiscent of siberians. Similar to I. x aquatilis. Grows in shallow water.

Sibcorus



Sibiensis – (Sibiricae x *I.missouriensis*) – the first cultivar after nearly a century from the wide cross using a species from Series Lonipetalae obtained by G. B. Stoneking-Jones. Unfortunately there is only a short description in Check Lists so I cannot say anything more.

Sibigraphes – (Sibiricae x Chrysographes) and **chrysobirica** – (Chrysographes x Sibiricae) – as the hybrids from the two Subseries should be named. Common garden classification unfortunately treats all such irises as siberians. Meanwhile they are typical interspecies hybrids from wide crosses. Breeding is not easy, the percentage of 'takes' is low and, as should be expected, the plants are sterile. From all known hybrids only one cultivar – 'Foretell' - sets seeds and, as I read, only when pollinated by a 28 chromosome siberian. Some hybrids are attractive garden objects and deserve to be registered in the SPEC X category and separated into a group of their own. Both proposed names were used in the past by Perry as the names of his two cultivars, but this should not be an obstacle in naming analogous groups, the more so that such names for cultivars are now forbidden,

Hybrids from both groups usually show intermediate features sometimes producing exotic colours and are certainly worth attention.

Tetraploid siberians, known for some decades, and tetra sino-siberians obtained not so long ago by conversion by E. Berlin and T. Tamberg allowed Dr. Tamberg to breed hybrids of tetra sibigraphes type. So far there are only a few such irises. According to Tamberg crossing is very difficult. Hybrids resemble siberian irises. Hybrids of chrysobirica type have not yet been obtained. Dr. Tamberg succeeded in pollinating a tetra siberian with sibigraphes pollen but the seedlings are similar to the mother plant. Crosses between tetra sibigraphes produce seeds.

Knowing the hybrids only from reading I cannot add any of my own observations. My own attempts have failed.

Sibkeri – (Sibiricae x *I.hookeri*) – hybrid analogous to sibtosa, listed due to the new status of *I.hookeri*.

Sibtocolor – (tetra sibtosa x *I.versicolor*) – a new type of wide crosses uniting three species from three different series. So far four seedlings have flowered – the first time in 2006. Plants are big and decorative with stems up to 130 cm carrying five to seven large flowers. The colours obtained so far vary from deep red to deep blue. They are very vigorous, needing plenty of water and grow very well in an artificial bog. Sibtocolors are of course sterile. At the present time two cultivars are registered.



sibtocolor 'Strong Personality' in clump



single flower

Sibtosa – (Sibiricae x *I.setosa*) – a very attractive group of hybrids. A. Perry first crossed these two species in the '20s of the last century, next, at the end of '30s, came M. Simonet. In 1979 the cultivar 'Stilles Wasser' which appeared by chance from open pollination was registered by E. Berlin. In the '80s T. Tamberg seriously started to breed these hybrids and realising their great garden value registered some cultivars. Other breeders followed him and such cultivars appeared in the Check Lists. Tamberg succeeded also with the conversion of sibtosa to tetraploid form. Unlike the diploids, which according to the theory are sterile, the tetraploids are fertile. This fertility allows new generations to be obtained and to form breeding lines. The presence of tetraploid siberians and tetra clones of *I.setosa* permits breeding tetra sibtosas by crossing without using the colchicine treatment so that new possibilities are opened up. Crossing tetra siberian with tetra sibtosa gives sibtosas $\frac{3}{4}$ – $\frac{1}{4}$; again sterile, but often very spectacular garden plants.

Sibtosa, both diploid and tetraploid, is intermediate between the parental species and usually combines their best features. Stems as tall as siberians, often taller, branched, with many buds. Big flowers with shorter standards. Colour range wide enough and in future will probably be even wider. Vigorous plants need generous watering and may grow in beds, in artificial bogs and even in shallow water.

Note: Flowers of siberians should be pollinated by *I.setosa*. Backcrosses never succeeded for me; this observation is confirmed by T. Tamberg and independently by Ukrainian botanist O. Amekhin



Diploid sibtosa 'Uśmiech Afrodyty' ('Smile of Aphrodite')

Calsib – see Series Californicae

Longsib – see Series Longipetalae

Verbiritosa – see *I.versicolor*

Verrica – see *I.versicolor*

SUBSERIES CHRYSOGRAPHEs

Sino-siberian irises

Still undervalued as garden plants these irises are appreciated by the hybridisers as a good object for wide crosses. As in the first Subseries so here all the sino-siberians are treated as one species in the widest sense of the word.

Calsib (Californicae x Sibiricae) – as well calsibe or cal-sibe – similar variants of the name used, it seems, in the middle of '70s of last century. The name is misleading suggesting these hybrids are obtained from Californian irises pollinated by siberians. It is however a custom that the name is given by the breeder who first obtained a new type of hybrids, so it probably will not be changed. It covers three or even four groups different enough to be described separately. Readers will find these groups under the same common name in different places according to the principle that the description is under the female parent.

The hybrids of irises from the Subseries Chrysographes pollinated by Pacific Coast irises form the vast majority of this big and still growing group. These hybrids should be named **chrysofornica** (Chrysographes x Californicae). Using the parts of the names of parental plants is not obligatory. A Latin adjective being in character of the hybrids would do as well, but the proposed name at once shows the pedigree of the group.

Calsibs are very attractive, as a rule similar to both parents so usually there is no doubt if the cross was true. Often taller than Californicae, sometimes with better bud count, with wider decorative leaves they have very rich colour range, wider than siberians. They need good soil, calcium free, and plenty of water. Usually frost hardy they may become an original ornament in the gardens of colder climate sharing with viewers at least a part of the beauty of the Californicae. On the diploid level the plants are sterile,

For more than ten years Dr. Tamberg has bred tetraploid calsibs obtained by colchicine treatment. These plants are fertile due to doubled chromosome number. That allowed breeding to be continued. The results are unusual and beautiful indeed – the plants have all the values of diploid calsibs but the flowers are bigger and stems stronger. Some cultivars are already registered and for sure it is only the start of the group with a successful future.

Dr. Tamberg crossed again some of his tetra calsibs with tetra sino-siberians as well as with tetra Californicae and named these new hybrids '**sibcals**' in order to distinguish them (see below).

A small group of hybrids from the cross Californicae x Chrysographes deserves separate discussion – see under Californicae.

Hybrids of siberians x Californicae are included also in calsibs and that is evidently unjustly. Very small so far this group will also be discussed separately.

Chrysata – (Chrysographes x Ensatae) – hybrid of a sino-siberian with *I.lactea*, the only representative of Series Ensatae. Till now two cultivars registered by Tomas Tamberg. There is also a tetraploid clone, registered in 1988, obtained by conversion also by Tamberg, of course. The breeder uses it for backcrosses with tetra sino-siberians. In his opinion tetra chrysata $\frac{3}{4}$ – $\frac{1}{4}$ is a promising hybrid and raised plants have the charm of their own. I have seen tetra chrysata and for me it is itself a nice plant.

Chrysmatica – (Chrysographes x *I.prismatica*) – no cultivar registered and the SIGNA Check List contains no note about any cross, but such hybrids were obtained by Dr. Samuel Norris (USA) and next T. Tamberg bred similar plants. On the web page of Tambergs there are two photos with a comment stating the plants are sterile with small flowers and winding stems, difficult in cultivation.

Chrythenica – (Chrysographes x *I.ruthenica*) – hybrids raised by Tamberg are easy to obtain, according to the breeder. As a cross between diploids (though I suppose *I.ruthenica* is a natural tetraploid) sterile. Breeder writes the flowers deteriorate in few hours after opening so the decorative value is not big. So far unregistered.

Chrytosa – (Chrysographes x *I.setosa*) – at the present time only one cultivar registered by T. Tamberg. The cross is possible but very difficult. Tetra sino-siberian pollinated by tetra *I.setosa* may possibly give the tetra hybrid of the type but a lot of luck is needed. So far it is only a theory

Sibcal – as it was said it is the name given by Dr. Tomas Tamberg to his tetraploid hybrids obtained by crossing the tetra clones of the calsib type with tetra sino-siberians or tetra Californicae resulting in $\frac{3}{4}$ Chrysographes to $\frac{1}{4}$ Californicae or inversely $\frac{3}{4}$ Californicae to $\frac{1}{4}$ Chrysographes. The hybrids are sterile but with beautiful flowers. I was allowed to register one cultivar from Tamberg's seed (see photo right). Plant needs rich and moist soil; it grows about 130 cm, stems are crowned with big flowers. I am sure such plants will be soon desired by gardeners. Breeding unfortunately is possible only for owners of tetraploid parents.



Sibcal 'Przybysz' ('Newcomer') seeds from T. Tamberg

Calsib, calsibe or cal-sibe – see under Series Californicae
Chrysobirica – see under Subseries Sibiricae

SERIES CALIFORNICAЕ

Pacific Coast Irises (accepted name for garden category)

Hybrids of Californicae with species from other Series are of course nearly completely different plants, as diploids sterile, nevertheless breeding them is probably the only way to show at least a fraction of the beauty of the PCIs in the gardens in cold climate. That is why even the very wide and difficult crosses are worth trying.

Calsata – (Californicae x Ensatae) – hybrids of Californicae and *I. lactea*. First S. S. Berry in 1931 obtained and registered such cultivar. Tamberg too obtained such hybrids but did not register any though described them in one of his articles in the BIS Year Book. The only registered Polish cultivar resembles both parental species having small but nice flowers in deep blue violet, nearly black, with gold dots along signal. It grows quickly and blooms profusely. Replanted from initial place in cold frame needed a year to establish itself but then grew and bloomed well despite certain neglect. Other plants from the same cross had yellow leaves and died during first hard frost.



Calsata 'Across the Ocean'

Calsib - (Californicae x Sibiricae) – in this group are included, in my opinion wrongly, difficult to obtain hybrids from crossing PCIs with 28 chromosome siberians. It is believed that cross is possible only if mother plant was PCI and siberians gave pollen. The difficulty is in fact the siberians start to bloom when PCIs are nearly out of bloom. In my garden PCIs do not bloom so early and I obtained seeds few times but none germinated. At the time being three such hybrids are known – one obtained by Lawrence many years ago, another by Jean G. Witt and the last one by Tamberg. I suggest for such hybrids the name **calibirica**.

Calsib – interestingly, only the cross Chrysographes x Californicae (mentioned earlier, with proposed name **chrysofornica**) is easy. Though the PCIs and sino-siberians are related it is very difficult (in opinion of Tomas Tamberg simply impossible) to pollinate a PCI with pollen of a sino-siberian. For many years there was known only one such cultivar, registered by Perry nearly hundred years ago under the name 'Dougrophes'. I did not know then that it is so difficult and tried to make such cross a few times and even obtained seeds which later did not germinate. At last I succeeded and in 2001 four seedlings appeared. They

were planted in wrong place so grew slowly but nevertheless they formed quite nice clumps and after four years they flowered. One was already registered, good plant with stem 70 cm tall, branched, carrying 5-7 buds. Two others will be probably also registered. All the plants are completely hardy and survived already two strong winters with frost below -25 Centigrade what was a nice surprise. Writing this booklet I tried to find other such hybrids in the Check Lists and it turned out that there were other registered cultivars though not many. For this group I propose the name **caligraphes**.



Chrysoformica 'Liryczny Nastrój'



Caligraphes 'Immigrant's Child'

Tenosa – (*I.tenax* x *I.setosa*) – very small group with only one registered cultivar, coming from free pollination. At the end of '30s of last century Marc Simonet obtained such hybrids and gave them the name but none was registered. Many years later Mrs. E. Page took the pod from *I.gormanii* (yellow variety of *I.tenax*) and raised a hybrid resembling *I.setosa*. This was registered by Mrs. W. R. Hubbard as 'Elvie B. Page'. The cross is very difficult, the seedlings usually grow slowly and for years do not bloom. T.Tamberg lost heart with these hybrids and gave up his attempts. My crosses were a failure – PCIs pollinated by *I.setosa* gave seeds which did not germinate, crosses in reverse direction gave some seedlings ... of pure *I.setosa*.

Calsib – see above under Subseries Chrysographes

Longwat – see below under Series Longipetalae

Monwat – see below under Series Longipetalae

Sibcal – see above under Subseries Chrysographes

SERIES LONGIPETALAE

Less known irises probably because they are not hardy in a colder climate. My attempt to cultivate *I.missouriensis* failed. Small and poorly growing clump vanished after three years without any bloom during this period. In breeding there were only a few attempts noted.

Monwat – (*I.montana* x *I.watsoniana*) – the name created from two old names, changed later. To day the pedigree is denoted *I.missouriensis* x *I.douglasiana*. Cross of Amos Perry from the first quarter of XX century, recorded but not registered.

Longsib – (*I.longipetala* x *I.sibirica*) – again cultivar of A. Perry registered in 1925. Flowers in form resemble siberians, greyed colour and strong veining descend from *I.longipetala*. It is unknown if anybody tried to repeat this cross.

Longwat – (*I.longipetala* x *I.watsoniana*) – another Perry's cross, confirmation that irises from this series may be crossed with the PCIs. The same case as above, nobody has tried to repeat this experiment.

Tollong – (*I.tolmieana* x *I.longipetala*) – plant obtained by Perry back in the XIX century, registered 1906, combining both actually recognised species. *I.tolmieana* is now called *I.missouriensis*.

A note was found about a hybrid of *I.longipetala* with *I.tectorum* but there were no details and such cross seems improbable. It is unknown if anybody tried to verify the information.

There is no agreement if *I.longipetala* and *I.missouriensis* are two different species or only the synonyms of one. The Series asks more questions than it gives answers. There are now five group names, but they are represented only by one hybrid each. Should monwat be named now missfornica? If there were more attempts probably, but a single clone should keep its historical name.

Sibiensis – see under Subseries Sibiricae

SERIES LAEVIGATAE

Unlike other important large Series which can be treated as one big species, the Laevigatae are differentiated. All the species included here are very important particularly for breeders interested in interspecies and interseries crosses.

Iris ensata

There were suggestions *I.ensata* is so different from other species of the Series that should be classified separately. Oleg Amekhin even postulated separate subsection for it. No wonder then that the successful crosses between these beautiful irises and other species are rare.

Some botanist consider the sterile forms of *I.setosa*, found in the wild in Japan, to be hybrids with *I.laevigata*; others think they are the result of crosses with *I.ensata*. As far as I know no one has investigated this, even the chromosome count is still unknown which would help to clarify the problem.

There is only one cultivar in the Check Lists registered in 1941 by J. A. Kemp as 'Aureaefolia' which is from the cross *I.ensata* x *I.laevigata*. Such a cross should be named **ensigata** and if the opposite cross is also possible then the second group should be named **laevisata**. The cross is however very difficult and my numerous attempts failed. Dr. Tamberg told me that Dr. Yabuya obtained a tetraploid hybrid of one of these types after conversion. The clone is fertile and very promising. Akira Horinaka informs in his book about *I.laevigata* that Dr. Yabuya obtained hybrid plants by embryo culture in 1975 from the cross of *I.laevigata* and *I.ensata* and in 1985 the tetraploid clones were induced in vitro culture of embryos treated with colchicine. It shows how difficult is to obtain results from such cross.

A few years ago there was excitement about hybrids of Ms. C.Hensler who crossed Japanese irises with siberians in both directions. Diploid hybrids were said to be fertile. Some of the hybrids were registered. After initial enthusiasm came silence. From distinguished breeders and experts who received the plants for trial no one found any features confirming their hybrid character. Many breeders tried to repeat the crosses with no result, including me, but it proves nothing. It should be added for justice that the chromosome counts gave the intermediate number $2n=26$ but the counting was done not in the laboratories and not by specialists. I am joining the prevailing opinion that – at least at the time being – such hybrids do not exist. If they appeared the groups should be named **ensarica** and **sibsata** according to the mother plant.

Ensicolor – (*I.ensata* X (*I.versicolor* x *I.virginica*)) – name given to the type represented by only one cultivar obtained by Oleg Amekhin, aforementioned Ukrainian botanist and breeder. He was the author of this interesting and very difficult cross.

Ensigata – mentioned in the above group of hybrids. Dr. Tamberg said the plant had nice flowers and branched stems. I cannot add anything more.

Pseudata – see under *I.pseudacorus*

Versata, biversata, reversicolor – see under *I.versicolor*

Iris laevigata

'A Guide to Species Irises' mentions *I.brevicaulis*, *I.delavayi*, *I.ensata*, *I.orientalis*, *I.prismatica*, *I.sanguinea*, *I.setosa*, *I.sibirica*, *I.versicolor* and hybrids of Louisiana irises as species and groups which produced hybrids with *I.laevigata*. I did not find confirmation for some of the listed species. My own attempts to cross siberian irises with *I.laevigata* failed. In 2001 Ms Nerissa Marshall from Australia registered two cultivars obtained from the cross *I.laevigata* x *I.chrysographes*. Short descriptions in the Check List mention only the colour - beetroot purple - which may suggest the cross is true. If the information is confirmed the group should be named **laevigraphes**. Few weeks ago Mrs. Anne Blanco-White informed me there is a hybrid of 'Donau' (*I.pseudacorus* tetraploid) x *I.laevigata*. It sounds very interesting so let us wait for next informations. A. Horinaka in above mentioned book writes that he obtained a few times seeds from the cross of *I.laevigata* x Louisiana hybrids but none germinated. Reverse cross did not produce seeds. From the first type of crosses (I should name it **laevigona** from *I.laevigata* x Hexagonae) Horinaka obtained seedling in 1988 using embryo culture. Nothing more is known.

Ensigata – see above under *I.ensata*

Sevigata – see under *I.setosa*

Versilaev – see under *I.versicolor*

Virgilaev – see under *I.virginica*

Iris pseudacorus

A similar situation as with *I.laevigata*. I read that hybrids were obtained with eight different species but I could not find any confirmation for hybrids with *I.fulva*, *I.prismatica*, and a Louisiana iris. Crosses with Spuriae were registered but the prevailing opinion is that they were doubtful and the plants do not exist so verification is not possible. We know instead the mysterious cultivar 'Holden Clough' and the whole group of unusually attractive offshoot cultivars which will be described below. For some years I hoped the hybrids with *I.setosa* would be very interesting but through years numerous crosses both on diploid and tetraploid level in both directions gave no result. O. Amekhin once obtained diploid seedlings from such cross but they were completely without chlorophyll and soon died. Nevertheless the vitality and vigour of *I.pseudacorus*, the existence of tetraploid cultivars and particularly the yellow colour absent from other species in this Series make it worth trying to cross *I.pseudacorus* with other species and hybrids.

Pseudacolor - (*I.pseudacorus* x *I.versicolor*) – only a few hybrids of this type were registered but probably many attempts were successful. The hybrids however are too similar to *I.versicolor* and as for now they do not inherit the yellow colour; they are usually deep blue or violet. Decorative value is rather average. Nevertheless it is possible that the potential of such crosses is still unexploited.

Some breeders tried to cross tetraploid clones of *I.pseudacorus* with *I.versicolor* and with hybrids named reversicolor (see *I.versicolor* under versata). I have a few plants grown from seeds from SIGNA and some are quite interesting though yet under evaluation. Features of *I.pseudacorus* are hardly visible. Plants grow taller than *I.versicolor* and have bigger flowers.

Pseudata – (*I.pseudacorus* x *I.ensata*) – extremely interesting and promising group of hybrids. Cross is very difficult and leads to pollination only when mother plant is *I.pseudacorus* which usually blooms considerably earlier than Japanese irises which have to give pollen. Percentage of obtained pods compared with number of pollinations is less than 10. To date, backcrosses have been unsuccessful. (Admittedly one cultivar from such cross was registered but it was not verified.) Germination is erratic, most seedlings have yellow leaves without chlorophyll. If all these obstacles were overcome you may be rewarded with plants having flowers similar to these of Japanese irises, though smaller, in yellow colour which is absent from JI though other colours, e.g. violet may show. Work with tetraploid clones of both species gives a chance for fertile hybrids and in consequence for next generations. However, as far as I know, no one seedling from tetraploid crosses was yellow.

It seems that the first reason for such crosses was the lack of yellow *I.ensata*. Breeders tried to raise irises resembling Japanese irises which would widen the colour scale. Japanese breeders Shinnosuki and Ryuichi Osugi first obtained a hybrid from such cross. It was famous yellow 'Aichi No Kagayaki' bloomed first in 1962 but registered by Japanese Iris Society only in 1993. Next came 'Kimboshi' by Ueki and now there are many such hybrids. In 1999 Kamo Nursery registered 'Hatsuho' which according to Check Lists had deep green leaves and this means the exceptional female parent. Nursery claimed also it was the first such hybrid

fully pod and pollen fertile and it was indeed a sensation. Fertility was proved by Dr. W. Ackerman who in 2001 registered 'Ohayo Gozaimasu' from 'Sayo-no-Tsuki' x 'Hatsuho'.

In United Kingdom Dr. J. R. Ellis was the first who raised 'Chance Beauty' from *I.pseudacorus* x *I.ensata*. The cultivar is fertile but its seedlings usually are the reversion to *I.pseudacorus*. 'Chance Beauty' was awarded an AGM. Its sibling 'Fair Chance' bloomed later and received an AM.

Eye Shadow hybrids are a special part of the described group. Japanese breeder Mr. Hiroshi Shimizu imported from the whole world seeds of *I.pseudacorus* and raised more than 100 clones which he pollinated with pollen of different Japanese irises, sometimes using mixed pollen. Between the hundred clones he found one giving pods more often than other. Growing seedlings had green leaves. Shimizu named this clone 'Gubijin' and this plant changed the breeding of pseudatas. Subsequent seedlings have nice flowers coloured from cream to yellow and even to pale pink with ornament of lines around the signal reminding the shadow from eye lashes. The new irises aroused great interest in the iris world and brought to the breeder a great success – he was awarded by AIS the Hybridizers Medal and then the Bee Warburton Medal.

Certainly yet another clones like 'Gubijin' exist. Tony Huber lately obtained and registered from unknown clone of *I.pseudacorus* some hybrids which have similar colour range as Eye Shadow hybrids.

'Holden Clough' and next generation hybrids – in 1971 an unusual hybrid was registered. It was found in the field planted with *I.chrysographes* seedlings. At first sight it resembled *I.pseudacorus* but deep yellow flowers were covered with violet brown lines. It was recognised as *I.chrysographes* x *I.pseudacorus* hybrid and was named for the nursery in Lancashire where it was found. The chromosome count was 37 which suggested the other parent had had $2n=40$. When the hybrid was better known and popularised some experts came to the conclusion it had not the features of *I.chrysographes* and the second parent was declared *I.foetidissima*. This opinion was strengthened by fact that nobody obtained seed from the cross *I.chrysographes* x *I.pseudacorus* though many breeders tried. I do not know if anybody tried to cross *I.pseudacorus* with *I.foetidissima* or if anybody tried to explain how such seed could get in the mass of the *I.chrysographes* seeds. The riddle was later solved in the laboratory by Dr. J. R. Ellis, a cytologist, whose investigation showed it was a sport of pure *I.pseudacorus* but with three additional chromosomes. It is a pity that the result of the investigation was not published to be known to the wider circles. 'Holden Clough' gives sometimes seeds though not often and from open pollination only. Some seeds germinated giving the origin of 'Roy Davidson', 'Phil Edinger' and other. One seedling of this kind was colchicine treated by Tamberg, most probably converted to tetraploid, and named 'Berlin Tiger' – very attractive cultivar, fertile, though the fertility is not unlimited. Most of these cultivars, unfortunately, with the exception of 'Berlin Tiger', are not very hardy. In last years seedlings from third generation appeared, for example Terry Aitken's white, striped violet, 'Roy's Lines' and 'Roy's Repeater'.



Two seedlings from 'Berlin Tiger' (open pollination)

Sibcorus – see under Subseries *Sibiricae*

Virgicorus – see under *I.virginica*

Iris versicolor

Very important species for breeders, natural tetraploid, as it was said, opening many possibilities. Crosses with many species are relatively easy, with some other even very easy. The list of types of hybrids of *I.versicolor* origin is quite long but it seems it may be yet longer.

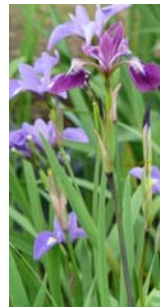
Robusta – properly **I.x robusta** – American botanist Edgar Anderson so called his hybrids from crosses of *I.versicolor* with *I.virginica*. He was the first who obtained these hybrids from controlled pollination. Strong and quickly growing plants, combining features of both parents, give sometimes valuable seeds. Few registered cultivars, some from open pollination, recognised in gardens or in the wild. The best known is 'Dark Aura' very interesting and attractive because it has in early spring deep violet leaves becoming green few weeks before bloom. Deep blue flowers are placed on dark, nearly black stem.



flower

I obtained interesting plants crossing my own seedling of robusta type again with *I.versicolor*. New seedlings are vigorous and make clumps quickly. One of them is very decorative having cherry red flowers with big white signal on tall violet stem. Unfortunately the photos do not show the true colour.

I. x robusta (1/4 – 3/4) selected seedling



coloured stem

Verbiritosa – (*I.versicolor* x tetra sibitosa (Sibiricae x *I.setosa*)) – cross analogous to sibitocolor but with *I.versicolor* used as mother plant. Extremely vigorous hybrids grow very quickly. From nine seedlings three bloomed in first year after germination. Stems above 100 cm, flowers about 10 cm wide with flared falls in deep blue violet to red purple. Big white signal is rounded with irregular white dots. Two branches lengthen before opening their buds resulting in all flowers blooming on the same level but in sequence. This feature seems very attractive and unusual.

verbiritosa 'Three Continents'



Verganica - (tetra versilaev (*I.versicolor* x *I.laevigata*) X tetra *I.virginica*) – it is the cross of new type in which the tetraploid clone of *I.virginica* was used. First seedlings bloomed in 2007. Clearly intermediate between the parental plants. Cross combines three different species from the same Series. Four seedlings are very similar to each other. One seedling was registered. Blue flowers with white lines, yellow signal, big and conspicuous. Tall stems, about 130 cm, strong. Grows in water.

Verganica 'New Possibilities'



Verrica – (*I.versicolor* x *Sibiricae*) – from the same species as *sibcolor* but here cross is made in opposite direction using *I.versicolor* as mother plant. Plants from this group are evidently different from *sibcolor*s. In flowers features of *siberians* are less visible though still present, falls are longer and arched down. In spring leaves are nearly white becoming green in course of growing. I had two such seedlings from two different crosses and both had the same serious flaw – young white leaves and the stem buds hidden inside them were very prone to late night frosts (which usually happened in the first half of May) although they survived winter in good form. One clump never bloomed so was disposed of, another one bloomed nicely twice but next year, after strong morning frost, died. In spite of all I shall try the cross again. In more moderate climate the problem should not exist.

Versata – (*I.versicolor* x *I.ensata*) – group of hybrids from pollinating *I.versicolor* with pollen of the Japanese irises. Canadian Tony Huber was the first who obtained them. Reverse cross never succeeded. Flowers bigger than those of *I.versicolor* in similar colour range, standards and signal resemble *I.ensata* cultivars. Generally these hybrids are similar to the *versilaev* group, which will be discussed below. Cross is difficult and obtaining these hybrids was certainly an achievement. Hybrids are partly fertile and sometimes give seeds when pollinated both with *I.versicolor* or *I.ensata* pollen. Huber called these hybrids **reversicolor** and **biversata**. He used also yet another names like *Xversata*, *reversata*, *reensata* etc. I must confess I prefer the system of Dr. Tamberg according to which it would be *versata* $\frac{3}{4}$ – $\frac{1}{4}$ or $\frac{1}{4}$ – $\frac{3}{4}$ or simply 3-1 or 1-3. It seems much clearer.

My experience with this group is rather limited. Seeds of *reversicolor* from Mr. Huber (via SIGNA seed exchange) produced plants looking completely like *I.versicolor*, fertile and unfortunately not interesting. They went out. One seedling of *biversata* type was intermediate between Japanese irises and *I.versicolor* but in unattractive fading grey pink colour. This one I keep as it is fertile so useful for some attempts of wide crosses. Seeds of *versata* type I have ordered many times and each time unfortunately *I.versicolor* was received. At last one seedling of *tetra versata* was true and nice and I hope I should be able soon to say more.



Reversicolor (selected seedling)



I.versicolor (left) and *reversicolor*



versata tetraploid (selected seedling)

versicorus – (*I.versicolor* x *I.pseudacorus*) – only one cultivar of the type was registered. Perhaps the cross using tetraploid clones of *I.pseudacorus* would give more exciting results. My own attempts were unfortunate.

Versilaev – (*I.versicolor* x *I.laevigata*) – so called by Tomas Tamberg extremely impressive hybrids of two interesting species from the same Series. Nice flowers, a bit smaller than these of *I.laevigata*, but much bigger than blooms of *I.versicolor*, having inherited from mother plant much wider range of colours than *I.laevigata*. Diploid hybrids, according to the theory sterile, though with some exceptions, had been known in Japan for many years. About twenty cultivars exist there though, unfortunately, they are not present in the World Register. The barrier of infertility was broken definitely few years ago by Dr. Tamberg who obtained by colchicine conversion tetraploid clones. The breeder generously shared out the seeds from new plants and these hybrids appeared in many gardens. In my garden the plants grown from the received seeds had been crossed easily and in 2009 first Polish cultivars were registered obtained from next generation of seedlings. *Versilaevs* are vigorous, quickly growing as well in water as in an artificial bog. They bloom profusely and the leaves stay decorative till autumn. The genetic pool is rich enough due to the Tambergs work so new colours appear in next generations. I am sure that breeding these irises may be very satisfactory.

The history of this type of hybrids started in 1929 when Clyde Chandler of the New York Botanical Garden raised first such plant. It was unexpectedly fertile. Next hybrid from G. M. Reid was sterile. A. Horinaka has hybridised such hybrids from 1966 and has observed that some hybrids were fertile, some were not. My only diploid registered cultivar is fertile and has given the progeny. Tetraploid cultivars represent subsequent generations obtained from crossing seedlings raised from seeds received from Dr. Tamberg.



Versilaev diploid 'Oczekiwanie' (fertile!)



tetra versilaev 1/4 – 3/4 selected seedling



versilaev tetra 'Przepych'



'Rumunki Kid'



'Królewskie Barwy'

Versitosa – (*I.versicolor* x *I.setosa* tetraploid) – about ten years ago having my first tetraploid clone of *I.setosa* I obtained an interesting seedling from this cross. Flowers had short standards and deep dark blue colour. Seedling had no pods but with its pollen used on *I.versicolor* I obtained some seedlings practically identical with mother plant. My versitosa died after a year due to an infection which killed some valuable plants. A similar seedling was obtained a bit later by T. Tamberg who informed me the plant is sterile. It was registered in 2011 as 'Bluebird Fountain'. Tamberg also gave the name to the group. Now I have two new seedlings of this type, one has six falls form. Cross seems worth trying.



Vertosa seedlings



Pseudacolor – see above under *I.pseudacorus*

Sibcolor – see under Subseries Sibiricae

Sibtocolor – see under Subseries Sibiricae

Iris virginica

Species less popular than *I.versicolor* and rarely used in breeding but attractive and worth attention.

Robusta – see also under *I.versicolor*. Only one registered cultivar has *I.virginica* as mother parent but it is enough for listing robusta here too. Seemingly there is no clear difference between this cultivar and these from reverse cross so they all are classified together in the same group.

Virgicorus – (*I.virginica* x *I.pseudacorus*) – again a new hybrid which bloomed for the first time in 2011. Seedling was obtained from cross of *I.virginica* x 'Donau' (tetraploid). In maiden bloom stem was not tall, the flower was medium blue with white lines and big yellow signal. Falls long, rather narrow but visible from distance. Plant will be under observation.



virgicorus

Virgilaev – (*I.virginica* x *I.laevigata*) – so are called the hybrids, per analogiam to well known versilaev, attractive but rarely bred. Seedlings are resembling versilaevs, perhaps not so vigorous. No cultivar registered, no tetraploid clone known.

Virgirica – (*I.virginica* x *Sibiricae*) – I have now two new seedlings from such crosses. First from diploid clones bloomed in 2010 showing intermediate features in flower's pattern. The other was obtained from tetraploid clones of both species and having white leaves in spring lost growing stem after hard late frost but survived. Both plants grow in water. Time will show if the cross had potential.



Virgirica diploid seedling

Virgona - (*I.virginica* x *Hexagonae*) – name suggested for hybrids of the species with Louisiana irises. There are some registered cultivars. It should be noted that due to cork covered seeds *I.virginica* was decades ago classified with *Hexagonae*. I have heard that this type of hybrids was known long time ago. Having no possibility of growing Louisianas I imported some seeds from such cross but robust plants during hard and snowy winter were completely eaten by voles.

Virsicogata – (*I.virginica* tetra x versilaev tetra (*I.versicolor* x *I.laevigata*)) – again a new group of hybrids parallel to those described under verganica. First seedlings bloomed in 2007. Tall plants with big enough flowers in blue colour, with big white signal and median line on falls. Two branches, five to seven buds. Excellent grower in water.

virsicogata 'Jezioro trzech rzek'
('Three rivers lake')



SERIES HEXAGONAE

LOUISIANA IRISES

Wonderful group, extremely interesting for breeders. Unfortunately my own experience is very limited. It would be an important event if somebody succeeded in acclimatising these irises. Breeding hybrids suitable for colder climate would be probably possible and growing them much easier. It would be a great achievement to bring even a part of the beauty of Louisianas to our gardens. Maybe one should try to cultivate them in a greenhouse? Or at least in a frame? Fascinating task for iris enthusiasts.

In the Check Lists I found three hybrids of Louisiana irises with Spuriae, all registered before 1940 and all questioned. The plants which probably do not exist any more had no intermediate features. No one could repeat the cross. There are some known hybrids with *I.virginica* but only a few in the Register as it was said above.

Virgona – see under *I.virginica*

SERIES PRISMATICA

There are some hybrids of *I.prismatica* with irises from the Subseries Chrysographes though they are not mentioned in the Check Lists. A few years ago I received from SIGNA seed exchange seeds from the cross *I.prismatica* x *I.douglasiana* but the seedlings proved to be a white form of mother plant. Nothing is known about another attempts.

Chrysmatica – see under Subseries Chrysographes

SERIES SPURIAE

The series is not so homogenous as those discussed above. Until now breeders only worked with some tall and large flowered species, other ones were not tried. It is not even known if it is possible to cross tall spurias with the short species. Tall species cross with themselves more or less easily despite some differences in chromosome number (most of them have $2n=40$, some $2n=38$ or 44) and hybrids are fertile. The cultivars come first from the 40 chromosomes group and are a mixture of the most used species. Treating them as an entity seems justified. To me crossing tall spurias with irises from other series seems impossible as my attempts gave no result but of course it proves nothing. Little is known about such crosses made in the past. Three cultivars registered as hybrids with Louisianas (one even in next generation with *I.pseudacorus*) were later admitted as not true.

A few years ago the outstanding breeder of spurias, Dr. B. C. Jenkins crossed an iris from this series with *I.lactea* but no details nor photos were published. Hybrids were not registered. Only once at the Convention of the Spuria Iris Society some photos were exhibited and well known iris expert Dr. James Waddick was very impressed by these hybrids. He wrote however only about his impression but did not write any description. How do the hybrids look, what about flowers? Do they exist still? Questions without answer. Dr. Tamberg doubts if such cross were possible though Dr. Jenkins was an experienced breeder.

Dr. Rodionenko suggested years ago a possibility of crossing spurias with *I.foetidissima*. The idea seemed very interesting so more that it was supported with arguments of some physiological similarities between the Series. Unfortunately *I.foetidissima* twice refused to survive winter in my garden so I could not try such crosses. Mrs A. Blanco-White nearly at the last minute found a report of Mrs E. Cleaves of USA who had obtained a hybrid from cross with *I.graminea*. Unfortunately after ten years the plant was lost and there was not even any photo. It would be possibly named **gradissima**.

Another suggestion of Dr. Rodionenko, supported by results of the genetic investigation in the laboratories of Kew Gardens concerns two species – *I.kolpakowskiana* and *I.winkleri*. These irises classified with Reticulatae are, so to say, half way between rhizomatous and bulbous irises. Both species are very rare and difficult to obtain.

Spurias seem to differ a great deal from other beardless irises. Nevertheless even the improbable possibilities of using these beautiful irises should be tried. Risk is not big – at worst lack of success.

Gradissima – (*I.graminea* x *I.foetidissima*) – from the report of the breeder we know the plant was like small *I.foetidissima*, 25-30cm high, with scarlet seeds not as close and in the pod which was a bit smaller than that of pollen parent. Though plant does not exist the report witnessed that such cross is possible and may be interesting.

SERIES FOETIDISSIMAE

I.foetidissima in Great Britain growing wild as well as in some gardens is not very popular on the continent. I never heard before about any hybrids though Rodionenko's suggestions, discussed above, were known for many years. Making corrections in this text I found however a cultivar registered in 2001 by G. G. B. Stoneking-Jones from USA who crossed this species with *I.pseudacorus*. The hybridiser is mainly interested in Hemerocallis but he made yet some other very unusual crosses with irises.

Foeticorus – (*I.foetidissima* x *I.pseudacorus*) – there is only short description in Check List so nothing more can be said.

Series Tenuifoliae

Irises practically not cultivated.

SERIES ENSATAE

Iris lactea

Tony Huber has distributed seed from a cross *I.lactea* x *I.typhifolia*. Dr. Tamberg informed me that seedlings from this seed looked very near to *I.typhifolia* but varied in colour from dark blue to white. He repeated the cross and obtained three seedlings. The name of the group is up to breeders. I should propose **labcirica** or **lactifolia**.

Calsata – see under Series Californicae

Chrysata – see under Subseries Chrysographes

Series Syriacae

Very rare plants, nearly unknown. Probably not in cultivation.

SERIES UNGUICULARIS

Very peculiar species cultivated in regions with soft winter, in Poland probably unknown. No attempts of hybridising.

OTHER HYBRIDS

Some years ago, reading an article about genetics of irises, I found a statement that at least in theory it is possible to breed an allotetraploid. It means a very special plant having four different sets of chromosomes coming from four different species. Speaking simply it would be a plant having four grandparents of four different species. It is of course not an easy task demanding a vast collection of tetraploid clones of species and interspecies hybrids.

The range of difficulties is very big. In a homogenous Series as e.g. PCI or sino-siberians, in which all the species cross with other ones easily, combining four species in one plant is possible even on diploid level and it is quite probable such plants already exist. Obtaining an allotetraploid however in such Series would need conversion of four different species as in these series there are not any natural tetraploids. It is already a serious problem. Every conversion from diploids to tetraploids is difficult and not always successful. Also the next step is unpredictable – the tetraploid clones of Japanese irises are not fully fertile and pollination is difficult resulting in small number of pods.

In the case of a series so differentiated as *Laevigatae* crosses leading to a combination of genes from four species in one plant are even more difficult. Some crosses may be done only in one direction, some tetraploid clones are not easy to obtain, tetra ensatas have limited fertility, some genetic or physiological barriers are impossible to break down at least with our present knowledge. Crossing hybrids is of course much more difficult. The breeder has to collect a considerable number of such tetra hybrids wanting to achieve the goal. Gathering plants for a start took me years and yet is not finished. I am still waiting impatiently for some seedlings. The time however was not wasted. In this period I obtained some new groups of hybrids having in their pedigree three different species, in two cases from three different Series. At last in 2007 the first group bloomed of four seedlings from four different species, the result of cross tetra sibtosa x tetra versilaev. The taste of success was unfortunately bitter. All the seedlings looked like male parent. It is probably an allotetraploid which is witnessed by complete sterility but without the value of being different. And only the chromosome count would give the definitive answer.

In the gardens where many different beardless species grow new hybrids sometimes appear by chance. Bumblebees are sometimes very innovative breeders and unharvested pods spread their seeds. Sometime it happens that a plant is very attractive. Some calsibes, robustas or sibcolors appeared this way and were later recognised and identified.

Writing this I do not suggest that all seeds from open pollination should be sown. If you however found a self sown plant it may be worth waiting for the bloom and possible identification. I advocate also watching carefully for pods of plants thought to be sterile. Nobody yet could pollinate 'Holden Clough' nevertheless from time to time there are some seeds from open pollination and from these seeds interesting cultivars were obtained. 'Sibtosa Princess' (Tamberg) has unbalanced chromosome structure ($\frac{3}{4} - \frac{1}{4}$) and rarely sets seeds but does occasionally. Probably it depends on some processes during meiotic division but I am not competent to offer any hypothesis.

I mentioned above some plants obtained from seeds marked as reversicolor x *I.pseudacorus* ((versata x *I.versicolor*) X *I.pseudacorus* tetraploid). Plants look like *I.versicolor* but are taller, very vigorous, with a bit bigger flowers. May be some patterns of flowers are a bit different from *I.versicolor* but I could not find any feature of *I.pseudacorus*. Are they indeed hybrids? I cannot say. Certainly the cross is worth repeating.

GENERAL REMARKS

CULTIVATION

Nearly all the hybrids above may be cultivated the same way. All need rich and wet soil, all should be planted about 5 cm deep. Most of them need acid pH, some – first of all PCI and Japanese irises – do not tolerate calcium. The same treatment is proper also for many beardless species. Only spurias, *I.lactea* and *I.missouriensis* need slightly alkaline soil, but spurias may grow successfully in slightly acid.

Roots must not dry out so irises should be replanted as soon as possible. If they have to wait keep them in a bucket with water. Do not cut roots, especially new, and take care while planting they are straight and lying lower than rhizomes. After planting water generously until the new growth will be seen.

Instructions usually advise to replant beardless irises in early autumn. In colder climates it is much too late. Replanting should be done not later than August 15; plants should have time to root properly before an arrival of first frosts. For Siberians and hybrids the best time is early spring when frosts have gone. Water growing irises may be replanted practically any time during the season, not later than in the first half of August, and better not during bloom period.

Cultivation in the artificial bogs was often mentioned above. I advocate this method as it is not very expensive, easy to be realised even in small gardens and allows growing water needing irises even on sand. A hole 50 cm deep is needed, minimum 50 cm diameter, maximum according to wish, limited only by size of the plastic foil. Dig out good soil and keep carefully nearby if not calcareous. Cover the hole with plastic foil. The thick one, used in the building trade, is the best. In case of a small place for one clump only even a big plastic bag would be enough. The top edges should be fastened to the ground with V shaped pins from thick wire or with long nails put every 40-50 cm. At the bottom goes a layer of coarse sand or gravel (5-7 cm) then a layer of manure (composted if possible) about 10 cm thick, then similar layer of peat moss and finally the dug soil. If the soil is calcareous some sulphur may be added but probably better would be to obtain new soil. Add water, not too much, and plant the irises keeping the distance of 50 cm between the plants. Then tread down the soil. It should be at least 8-10 cm below the ground level. Fill the bog with water. Borders may be decorated with stones according to personal preferences. Keep watering once a week, in case of drought fill the bog completely again once a week. If it rains watering is not needed. I grow this way nearly all my beardless irises. Siberians need a small aperture in the bottom to drain off the excess of water. For water irises a hole should be a bit deeper and soil level about 15-20 cm below the ground. Watering usually is stopped in the middle of September of course taking the weather into account.

Such a bog should play its role for four to five years. After that plants probably will need dividing and replanting. When they are removed the bog may be carefully dug again, fresh manure added, and again used.

Old leaves in spring look ugly, especially those growing in water. They may be removed but with maximum care. For example young leaves of my *I. laevigata* cultivar are grey violet and are difficult to distinguish from old dead leaves. It is easy to cut them together with starting stems and to loose bloom. Old leaves of many irises are sharp. Cutting is best done with a knife, not scissors, and wearing gloves please.

Spray against the insects just before bloom and at the end of this period is beneficial. Take care to spray only flowers and buds, most of the chemicals are dangerous for fishes and amphibians. Spraying should be done early in the morning or near to evening for bees and bumblebees sake.

The demands of some hybrids, particularly the new ones, are not yet well recognised. There are some surprises – *sibtosa* grows well in shallow water, *sibcolor* grows better in a bog and the same may be said about *sibtosa* 3-1 (¾ *Sibiricae*) which was predictable. Plants with white leaves in spring are prone to damages by late frosts though they descend from completely hardy species. Careful and experienced gardeners will certainly find proper methods of cultivation.

BREEDING

Technically the pollination of beardless irises is a bit more difficult than with bearded. Style arms and stigmas are usually smaller (especially in diploid flowers) and much more tender. Breeders have to observe the plants which they want to use and to open the flowers by hand when they are swelling just before opening. Detecting the moment is quite easy. The falls, which are a landing place for insects, should be very carefully cut away (I prefer to remove standards too) and the anthers should be removed at the same time – the styles are very fragile and easily broken which means the loss of the flower. With some practice and care all the falls may be removed by hand together with anthers in the same action. Tweezers for extracting the anthers, small soft brush for the pollination and small plastic containers for keeping the pollen are useful tools of trade.

After few hours when the stigmas are deflected from style arms put the pollen with the brush or directly from the anther on them. The brush should be later disinfected with 70% alcohol and allowed to dry before next attempt. Next wait few days and the positive results will be visible – the pod will swell.

Do not pollinate during heat. In high temperatures with drought the watering in previous evening is advised and pollinating next early morning when the dew has dried. Water is the worst enemy of the pollen.

Contrary to the common opinion pollination in cloudy day is usually successful. If only there were no rain during an hour after pollination the percentage of takes should be high.

As a rule diploids should be crossed with diploids and tetraploids with tetraploids. It is advisable to make the cross in both directions - to pollinate flower A with pollen from flower B, then flower B with pollen of flower A. The seedlings may differ, sometimes significantly. Some parts of the DNA are saved in mitochondria and are transferred to the gametes only by female parent. That makes the genetic material slightly different depending on the direction of the cross.

Planning interspecies or interseries crosses breeder should remember that using two tetraploid plants gives chance for obtaining fertile seedlings and in consequence forming breeding lines. Crossing diploid plants gives as a rule sterile plants and rare exceptions only prove this rule. Diploid hybrids however may be very interesting and decorative plants, useful for many gardens.

Nearly every interspecies cross is a travel to an unknown land. Some breeders suggest that plants with higher chromosome number should be pollinated by plants with lower $2n$ or $4n$. This rule too often does not work. It is easy to obtain sibtosas pollinating siberian iris ($2n=28$, $4n=56$) with pollen of *I.setosa* ($2n=38$, $4n=76$) no matter if we are using diploids or tetraploids. Opposite cross seems impossible or at least very difficult. Sibcolors are obtainable when siberians were pollinated by *I.versicolor*. Opposite cross however is also possible as was said earlier. It is known *I.pseudacorus* may give pods if pollinated by *I.ensata*. Nobody yet has successfully pollinated *I.ensata* by *I.pseudacorus*. No rule may be formed on base of these facts.

These were only some examples of known and already made crosses, successful or not. There are still a great number of crosses worth trying if only to know that they are not possible. It would be good to know if tall spurias may be crossed with the small ones, if any spurias may be crossed with species from other groups or what else would cross with *I.pseudacorus*. It is only the beginning of long list of unexplored possibilities.

Breeders must be ready for the unexpected. Seedlings of very tender PCIs crossed with not very hardy sino-siberians are completely hardy. Seedlings (verrica type) from hardy *I.versicolor* and siberians are tender. It is impossible to predict all possibilities when we have to do with new hybrids.

Breeders must be patient. Successful pollination is only a first step. Even quickly growing pod do not always ripen viable seeds. Pods from difficult crosses sometimes look well but the seeds inside are undeveloped. Obtaining ripened valuable seeds means next step. Sowing them means waiting for the germination. They should germinate next spring but I cannot say anything about the germination of seeds of the hybrids. Their demands are practically unpredictable. Usually I treat such seeds the same way as seeds from mother species but I do it always with a slight fear. Sometimes I had a bit of luck, sometimes not and I never knew if it had been my fault or the invalidity of the seeds. And only when the seedlings have reached maturity and finally blooms the breeder would be able to say the goal is reached.

Advice – do not sow seeds arduously putting every grain separately. Germination is better when seeds are sown closely and touch each other. Do not be too eager to select the good plants and eliminate bad ones. From my experience it follows that only the colour is evident. Form often is changing in next years, usually in second and third year plants grow taller, flowers are bigger and of better form. Unfortunately it happens also that the flower which in first bloom captured us in next years is disappointing. Let us observe the new plants at least for two years and only then make the decisions.

Fertility is an important factor. Fertile plants allow to form breeding lines and make further experiments. This leads to progress. Sterile plants may be very decorative and good garden objects but they cannot be used for farther breeding and the farther progress is impossible. Crossing tetraploid plants there is a good chance that the progeny will be at least partly fertile. The diploid hybrids however despite their unbalanced chromosome set as well as some tetraploid plants of the 3-1 or 1-3 type sometimes are fertile making true the old saying that the exception confirms the rule. The fact that the usually sterile plants may sometimes set seeds is even more curious. The answer is probably hidden in the complicated meiosis process but I dare not make any hypothesis. Genetics unwillingly reveals its secrets. The only advise is to observe scrupulously all seedlings for possibility of unexpected.

IRISES FOR WET PLACES

Practically all of above listed, as well as many species. Calsata was not tried in such situations and I cannot say anything about chrythenica and the Longipetalae hybrids.

IRISES FOR DAMP SITUATIONS AND ARTIFICIAL BOGS

All hybrids of my breeding except calsata grow in my garden in artificial bogs.

IRISES GROWING IN WATER

Aquatis, pseudacolor, reversicolor, robusta, sibcolor $\frac{1}{4}$ – $\frac{3}{4}$, sibcorus, sibtosia (shallow water), verbiritosa, verganica, versicorus, versilaev, virgirica, virsicogata, 'Holden Clough' descendants.



Versilaev diploid 'Oczekiwanie' ('Expectation')

A FEW WORDS IN CONCLUSION

While writing the booklet and then working on this text I have investigated many sources to be sure I collected all hybrids from wide crosses. Many times I met the words – 'hybrids are known with...' and there were numerous names of species but farther research has shown that the primary source of the information was impossible to find, such a hybrid was absent from the Check Lists. Even many registered hybrids had been the results of wishful thinking of breeders rather than of successful crossing. In Check List from 1939 I met registered cultivar from the cross TB x *I.versicolor*! Many registered hybrids caused excitement but then were questioned. The fact that somebody set pollen from a flower on the stigma of the other flower does not mean that the resulting seedlings are indeed planned hybrids. If nothing is known about the method of the pollination, if the plants do not show any feature of both parents, particularly pollen parent, the seedling must not be recognised as a hybrid.

In this text and in the included lists the reader will find mostly recognised and verified hybrids. SIGNA Check Lists were used as a basic source but much information came from personal communications.

Photos were made by the author in his garden. Apologies for poor quality of some of them.

UPDATED LIST OF GROUPS OF INTERSPECIES AND INTERSERIES HYBRIDS

aquatilis **	7
calsata	11
calsib, calsibe, cal-sibe	10,11
calibirica (calsib)*	11
caligraphes (calsib)*	11-12
chrysata	10
chrysobirica	8
chrysofornica (calsib)*	10
chrysmatica	10
chrythenica	10
chrytosa	10
ensicolor	13
ensigata*	13
foeticorus*	21
gradissima*	21
hookbirica*	6
hookcorus*	6
lacbirica*	21
laevigona*	14
laevigraphes*	14
laevisata*	13
longsib	12
longwat	12
monwat	12
pseudacolor	14
pseudata	14
robusta	16, 19
sevigata	6
sibcal	11

sibcolor	7
sibcorus**	8
sibiensis*	8
sibigraphes*	8
sibkeri*	8
sibtata*	6
sibtocolor**	9
sibtosa	9
tenosa	12
tollong	12
verbiritosa**	16
verganica**	16
verrica*	17
versata	17
versicorus**	17
versilaev	17
versitosa	18
virgicorus**	19
virgilaev	19
virgirica**	19
virgona**	19
virsicogata**	19

* proposed new names (by L.K.)

** new hybrids