Thoughts on
taxonomy

(Mayr)

If one accepts as species taxa which are interfertile and thus do not fit the biological definition of this category, then it is true that they could all likely have evolved by aid of natural selection. They belong to the same genepool and are actually races only of the biological species. If, however, this category is reserved only for the category as biologically defined so that a distinct reproductive isolation separates them, then species are never ~~[illegible]~~ produced by natural selection but by a very distinct process that involves disturbances in chromosome pairing, not genetical variation.

(Babcock)

Sci. Am. ~~[illegible]~~ Febr. 1979, p. 30–31, review of Atlas of World Population History: Colin McEvedy & Richard Jones, Penguin $4.95:

The authors argue engagingly and well; their case is strong, although clearly and necessarily a matter of reasonable estimation; cautious authors would never have tried this valuable task. What they have done makes sense although "consistency ... provides comfort rather than proof and we wouldn't attempt to disguise the hypothetical nature of our treatment of the earlier periods. But we haven't just pulled figures out of the sky. Well, not often".

Smith & Virkki 1978, p. 2:

... We could go on, but it suffices to state that a great deal is as yet untouched. It remains to be seen to what extent changing times will affect the future results. Much depends on the philosophical balance science vs. technocracy, which latter has lately been gaining ground disproportionately. This means that the so-called important tasks are receiving most of the support — the importance being in many instances defined by the most short-sighted of men. We trust that now as in the past the unrestricted curiosity of the human mind will remain the most potent means of uncovering significant scientific information.

p. 1: It is entirely possible, as is in fact verified in some Vertebrates and Chilochorus beetles, that very similar genotypes can reside in karyotypes drastically different in number, fundamental, chromosome number, and centromere position.......

Since the distinction between species and subspecies or varieties ~~[illegible]~~ is securely based only on the reproductive ~~[illegible]~~ isolation or its absence, ~~[illegible]~~ ~~[illegible]~~ .... whenever there are chromosome number differences or clear indication of other ~~[illegible]~~ differences that are known to cause genetical isolation, we classify the taxa in question as species and look for characteristics by aid of which they can be identified. In the absence of such indications, however, we have tried to utilize morphological discontinuities, though these have frequently proven to be insecure as shown by later cytogenetical observations. But what can one do when no other indicators are available? Therefore, taxa of which chromosome numbers are unknown and no hybridization experiments available, are to be regarded as tentatively classified — we then prefer to distinguish them as species, since the subspecific status would indicate that we know more than we actually do.

Sympatric, parapatric etc.: if same sp., if diff. sp.

We ~~use the~~ have reduced to the level of subspecies several ~~species~~ taxa ~~otherwise~~ accepted as species even by recent authors, but only when we feel the morphological, geographical and frequently also experimental evidence strongly indicates that they are interfertile components of a polymorphic species. We have, however, retained at the species level ~~some~~ several taxa for which the status of ~~the evidence~~ as a geographical race only there may be some though still perhaps insufficient evidence, because we believe it to be wiser to ~~regard~~ classify them at a too high level in a higher category rather than to inadvertently clutter the subspecies unit with taxa that may not be ~~totally~~ interfertile. Therefore, later studies are perhaps likely to reveal that several of the taxa of, e.g. Elymus and Critesion from the Asiatic or South American mainlands and other tiny representatives of the smaller genera are have preliminarily accepted at a level above their actual biological category. Whereas we do not anticipate that additional studies will reverse our decisions about any of the subspecies, or that any of our genera will be found to be biologically illdefined.

I am grateful for the interest shown by Bill and Pat and you, but I am somewhat confused as to the limited information I have received, almost exclusively by telephone, and that my proposals as to further actions have been tacitly declined and no efforts made to increase my input or to discuss with me various strategies. ~~After all~~, The most serious violations of our, not only my, human and civil rights may not have come from the Boulder minds but from others, and although both are interwoven, I look upon this as two distinct cases, one ~~that~~ was initially meant only to open up a way to force Smithsonian scientists into the project that we invented, but went out of hand when it was directed first in Washington when somebody decided to take the opportunity to enrich himself at my cost, and then again... to the crooked mind of a Boulder administrator, who for years had been looking for an opportunity to hurt us, for a reason unknown to me, ~~although I have my suspicions. And~~ and who sought the advice of a doubtful lawyer.

I want to harm no person, however crooked and harmful to me, but the two institutions involved ought to ~~be forced~~ show the honesty to make corrections rather than to continue to protect an apparently little competent lawyer by continuing to hurt me — but if they prefer to let the international scientific community judge and thus harm both the Smithsonian and the University, I prefer that that action be forced by other than us. But if no correction is made before, say, a year from now, I believe I am in my full right to tell my entire story in a book — though I would prefer not to.

Bonham, Hobbs etc.:

A misunderstanding or fallacious conclusion:

Crossability per se indicates ~~only~~ ~~the~~ ~~relationship~~ remote relationship only, but with some miscibility that makes some meiotic pairing possible, with considerable pairing / ~~of~~ higher relationships are indicated; partial miscibility, or almost complete, ~~full mis~~ is characteristic of species of the same genus, full ([illegible]) miscibility of races of the same species.

~~Eucenant~~

We realize that those used to a single generic name for taxa that we propose to divide into several genera, may doubt the necessity of this, although we feel that this is required to fit the available data and definitions accepted together; and we are convinced that the classification proposed, though still incomplete, is a great improvement over the generic confusion of these taxa for more than two centuries, and it is widely superior to any other classification earlier proposed and then especially the excessive lumping of all the Triticeae into a single genus Frumentum, as proposed by Krause (1898) but heeded by nobody. Although even our proposal may not be ideal, we feel it is widely superior to any intermediary so-called compromising solutions that are in fact no solutions at all.

A proposal to unite all the genera into a single group, which Krause (1898) proposed to call Frumentum but, according to the present International Code, must be named Triticum (?), would be a meaningless and great step backwards even from the confusion of the last century that usually accepted [illegible] for [illegible] a few artificial genera instead.

We realize that some of our alloploid genera still remain unnatural assemblages which, confluent, have not evolved by linear branching from the same original taxon; for various reasons, however, we refrain from dividing, e.g., Triticum into three genera, i.e. one around the AADD genome, another with AAGG, and the third with AADDDD, in addition to two genera of synthetics; so instead these polyploids remain based on convenience rather than evolution.

Alloploids produced through hybridization between species of distinct diploid genera are very rare and usually recognized as genera in their own right, e.g. Hylandra ...

The classification of the wheatgrasses has developed through numerous preliminary stages, each new stage being initiated on basis of new knowledge: Triticum, of Linnaeus including also grasses, ...

We believe that our present knowledge, though certainly not definite or complete, requires a new adjustment; we do not expect it to be acceptable by those who have become firm in their belief in the system they first learnt, but present it in the conviction that it is a wide improvement over the older attempts and especially an improvement from the point of view of possible plant breeding for which genetical relationship is important.

Definitions: genera, species, subspecies. | Allopolyploids often claimed to show "transitions", because they share characters with diploids (not always?) combined characters, produced in new
Evaluate and readjust the system from time to time to incorporate progress

... species described on basis of various concepts: 1) ... ...

Various levels of evolution: 1) One diploid hybrid differentiates into several that disperse away from their origin, mutations...
2) Some hybrids differentiate further, but without any crossability, to form species by gradual autoploid evolution
3) Others form an autoploid series
4) Some form allopolyploids → etc.

It all began with wheat. Before genetics had become a science, plant breeders were making efforts to increase the harvest of this most essential of all grains by hybridization and selection...

Much shallow nonsense has been written about generic delimitation (Bollons 1952, Hayward, etc.) and only a few serious attempts have been made to define this important category, morphologically, genetically, historically, anatomically, geographically etc.

In the wheatgrasses, which are recognized as a tribe distinct but perhaps polyphyletic morphologically but hardly evolutionarily (cytologically?) related to the Brachypodieae, a heterogeneous [illegible] all the genera and species by necessity are characterized by the same trends that separate the tribe from other such units; this has been misunderstood by some, e.g., e.g., Krause, Stebbins, ... Since they are related, natural hybrids between genera sometimes occur, and those between distant genera may be artificially produced: shows relationship, of. Dunser: crossability, not miscibility, but not closeness — misunderstood by some, e.g. Stebbins. - - - -

Any revision of the taxonomy of plant genera and species requires that the reviser commences by deciding about the principles to be followed. The most basic of these is the philosophical background since it ~~not only decides~~ will to a large extent determine the ~~type of class solution~~ method of approach and also the type of solution to be expected. Next comes a ~~[illegible]~~ decision about the system of classification with its categories, which have to be distinctly defined in order to avoid confusion. Then there is a review of what has been done in the past and of descriptions of each taxon in order to reveal the significance of older results for the work to be done and a selection of what of these are to survive and what has to be replaced. That leads to nomenclature...

Since before the rediscovery of the Mendelian laws numerous botanists and plant breeders have made more or less intense studies of natural and experimental hybrids between various wheatgrasses followed up more recently by detailed observations on their chromosomes at mitosis and meiosis that have demonstrated various degree of genetical differentiation with gradation from a complete fertility to apparent incompatibility. ~~These studies~~ An essential part of these studies are listed in our bibliography under the names . . . . and alone or with others under the combined names of associates.

These studies have to a large deal been made with plant breeding efforts in mind, but they have often resulted in various conclusions about the taxonomy and evolution of these grasses though more frequently by others than confirmed taxonomists. It has become evident from these observations, that the wheatgrasses in their strict definition as modified by recent authors (e.g. Dewey 1976) form a tribe clearly distinct from all other grasses both morphologically and cytologically. Some hypotheses have been advanced as to their ~~origin~~ possible evolutionary relationships with other grass tribes, but those remain purely speculative since numerous attempts to cross several of these species with several taxa from other tribes have been without success; however, morphological and cytological similarities may perhaps indicate evolution from a progenitor of either the tribes Festuceae or Bromeae, or, perhaps equally likely, from a progenitor of both those tribes and the wheatgrasses that is long since extinct.

Classification that ignores ~~evolution~~ cytogenetical data when available, and thus disregards evolution, does not make sense as being ~~biologically motivated, or~~ biologically or scientifically motivated and its socalled results are useless from any logical point of view.

Important for plant breeding since four major grains are in the tribe.

Bibliography: see Fagerlund, Biochemical Systematics. —

Tzvelev: Zlaki SSSR: Holub's review, Folia 13(1), 1978: 110 - 111.

. . . In the chapter on anatomical and morphological characters of grasses, characters of caryopsis, the life-forms, the anatomical structure of blades as well as the characters of spikelets and florets are discussed. At the close of this chapter Tzvelev gives a survey of evolutionary trends for 36 characters.

In the chapter on the evolution of grasses the author expresses his opinion on the phylogeny of the family. Its origin in mountains about the Middle Cretaceous period is presumed. According to Tzvelev the group originated from several evolutionary branches. Bamboos are not considered as a basic evolutionary group, even though their florets are of a very primitive structure, the phenomenon of heterobathmy and mosaic pattern of the evolution of this family is several times emphasized by the author in this chapter. Unlike Avdulov, Tzvelev considers groups with large chromosomes and with basic number x = 7 as evolutionarily more original. Great importance for the origin of genera and also of tribes is attributed to hybridization (p. 52); despecialization sometimes accompanies this process. An evolutionary survey may not be expressed in this family by means of a phylogenetic tree, but as a complicated system of evolutionary branches which in the earlier history of the group passed into a no less complicated system of branches no longer belonging to grasses. Tzvelev does not consider it possible to derive all tribes and subfamilies of modern grasses from any one present tribes of this family. A direct derivation of a certain tribes from another now existing may be considered only in rare cases, e.g. for Phalarideae (from Aveneae) or for Aristideae (from Danthonieae), but even this is not fully certain. As to the concept of the evolution of flower in this family, the author belongs to the reductionists. In contrast to authors of modern systems of grasses in which usually several subfamilies are distinguished, Tzvelev accepts only two subfamilies, Pooideae and Bambusoideae, to which Oryzeae (included here in Pooideae) could perhaps be added as a third subfamily. . . .

Production of genera and species is evidently a rare and irreversible cytological process which only after the fact is affected by the environment which polishes the result and decides about its survival. Whereas ~~races and~~ the evolution of races and subspecies is a much more frequent genetical and reversible phenomenon strongly affected by natural selection. The former result in the creation of reproductive ~~[illegible]~~ barriers that frequently have the character (strength) of incompatibility, but the products of the latter are at least essentially interfertile without genetical disturbances

One of the several Araceous plants growing in eastern North America from Florida and Texas north to the St. Lawrence region and subarctic Manitoba is a species of *Acorus*. It was ~~first~~ mentioned from this continent by Michaux (1803) and Pursh (1814), and had been observed also by Schoepf (1787) as ~~being indigenous~~ growing on this continent. These botanists and all ~~those~~ others mentioning this plant later regarded it as identical with the European species *Acorus Calamus* L. and most observers also felt certain that it had been introduced from Europe by the earliest colonists. None went farther in this claim than Merrill (1954), who even gave the exact dates and places for this introduction: Jamestown in 1607 and Plymouth in 1620, and suggested that it could even have arrived a few years earlier with the Mayflower, or at the French settlements in Canada.

Only one American botanist has clearly observed that the American *Acorus* is not identical with the European species but should be classified as a taxon of its own. In his Medical Flora, Rafinesque (1828) pointed out that although all botanists regarded the American and European *Acorus* to be similar, they differ as much from each other as ~~they~~ the Chinese *Acorus* ~~does~~ differs from them. He described our taxon as *A. Calamus* var. *americanus*, but later (Rafinesque, 1836) named it as the species *A. americanus* at the same time as he ~~described~~ mentioned the two more southern North American species ~~*A. flexuosus* and~~ *A. floridanus* and *A. flexuosus*. The last one had been described a few years earlier (Rafinesque, 1832) from Texas to Tennessee, while ~~the~~ *A. floridanus* was said to grow in Florida to Carolina.

It is characteristic of the American *Acorus* that its leaves and stems are shorter and narrower than those of the European taxon, the leaves are more acute, the spadix is thinner and longer although the number of flowers is the same. And the angle of insertion of the spadix is a little more than half that of the European plant and distinctly smaller than in any other taxon of the genus. Last but not least, the American *Acorus* is ~~completely~~ fully fertile while its European counterpart is ~~fully~~ completely sterile and has been reported to have been so since it was first mentioned in the literature.

Outside North America, the natural distribution area of the genus *Acorus* is ~~in~~ in eastern ~~Asia~~ and northern Asia south to Tonchin (?). Two species grow in the south, *A. tonchinchinensis* Schott and *A. gramineus* Sol. in southern China and Japan, but all other populations are usually referred to as varieties only of the Linnaean species *A. Calamus*. The northern and fertile variety *Spurius* Schott has recently been named as the species *A. asiaticus* by Nakai (1931?), and even earlier authors had regarded it as distinct enough to get a separate specific name. The typically sterile main form of A. Calamus is said to grow in some localities in China (cf. Wein, 19..), but it was described from Europe, while at the same time a variety verus was mentioned from India. It is, however, doubtful, if any Acorus is indigenous in India (~~south of the mounts~~ Nepal), and the species ~~is doubtlessly a late introduction to Europe~~, was certainly not met with in ~~Europe~~ central Europe until Matthioli got it to Praha from ~~Constanti~~ Konstantinopel in 1557 (cf. Mücke, 1908; Wein, 19..).

The sterility of the European Acorus has been much discussed from a merely philosophical points of view (cf. Wein, 19..), until Wulff (19..) in a series of papers was able to

demonstrate that it is sterile because it is a triploid. He also has been able to show that the fertile Asiatic and American taxa are diploids, as is also a population cultivated in the Botanical Garden in Copenhagen, but a fertile population from the Botanical Garden in Leningrad is tetraploid. The diploid number was also reported for A. gramineus by Nakajima (1933) and Ito (1942), and the tetraploid number is typical of ~~var. spurius~~ A. Calamus var. spurius and A. asiaticus according to Kurakubo (1940) and Ito (1942), though the latter authors evidently made a mistake in regarding x=11 to be the basic number for the tetraploid ~~taxa as well~~ material and Kurakubo (l.c.) for A. gramineus as well.

Although Wulff ( ) could state that the diploid number 2n=24 occurs in American specimens, his material originated from Minnesota and Quebec only, so that it was not possible for him to decide if also the triploid might occur on this continent. Since several authors (cf. Engler, 1906... 1935), and lately even Merrill (1954), have claimed that the *Acorus* has been introduced into eastern North America from Europe, a check of the real occurrance of both types had to be made. The results of these studies are reported below together with the taxonomical conclusions made and discussions on the real origin and history of the American plant.

1. Cytology.

The cytological material of the American *Acorus* studied by the present writers was fixed in Navashin's fixative and stained in crystal violet according to the methods described by Löve & Löve (1954) and Löve & Sarkar (1956). The plants originated from several localities on the central plains, but in addition seeds from eastern and southern sources were fixed after germination in petri dishes.

In all the American material only the chromosome number 2n=24 was met with (Fig 1). The chromosomes are rather small, and since the centromere is median or submedian, they are not well fit for detailed morphological study. As far as could be seen there are no differences between the individual chromosomes from distant populations, but in view of the above fact this statement must be regarded as very vague and indetermined only.

As to foreign material, the present writers have counted the triploid number 2n=36 on Swedish specimens fixed in 1944, and seeds from Japan and eastern Siberia germinated and were fixed to be tetraploid with 2n=48 chromosomes. Cultivated plants from southern Japan belonging to A. gramineus were found to be diploid, and the number 2n=24 was also counted on a few seeds from ~~Tonkin~~ (Cochinchina).

In this connection it should be pointed out that the material ~~previously~~ of Acorus previously studied chromosomally by Wulff (l.c.) and stated to be triploid with 2n=36 chromosomes included both European material of the typical form and Indian material of the var. verus L. Pelagren (1943) published the number 2n=36 from Swedish specimens, and [Vaarama (in Wulff, 1954) also counted the triploid number in Finnish material, but occasionally saw the diploid number in his specimens (Vaarama in litt. 1948). ~~The tetraploid number 2n=48 published by Wulff (~~ The tetraploid number 2n=48 was reported by Wulff (1940) from specimens derived from plants in the Botanical Garden in ~~Leningrad~~, and again (1954) from Japanese material. Most probably this number was only inexactly determined as 2n=44 by Kurakubo (1940) and by Ito (1942) for Japanese material. The latter author reported the number under the specific name A. asiaticus Nakai, while Wulff (1954) was of the opinion that his material belonged to the species A. spurius Schott. The diploid number was reported for the species A. gramineus Sol. by Nakajima (1933) and Wulff (1940) as well as by Ito (1942), while Kurakubo (1940) gave it as 2n=22 only.x) The chromosome number 2n=18 counted by Dahl ~~and reported~~ from Minnesota and reported by Buell (1938) and Dudley (1937) was an inexact count for 2n=24, while the report of the same number for A. gramineus and A. calamus by Malvesin-Fabres (1945) must be regarded as based on some mistakes.

x) Wulff (1940, 1954) also reported the diploid number for a specimen of unknown origin from the Botanical Garden in Copenhagen.

	2 n	2 n	2 n	3 n
	A. gramineus	A. cochinchinensis	A. americanus	X A. calamus
Rhizomes:				1-3 cm thick
Leaves:				0.7-0.9 cm broad
Spadix:				1-1.2 cm thick, 5-8 cm long.
Mittelrippe	undeutlich			deutlich

	Ym: sparsum	Ym: cristicum
Leaves:	narrow, 0.5-0.8 cm broad	
Spadix:	Zartrot, 3-6 cm long, 0.6-0.7 cm thick.	

2. Morphology.

The morphology of the diploid, triploid, and tetraploid specimens of Acorus, excluding ~~the diploids from North America~~ and A. gramineus, ~~and the tetraploid~~ was studied in detail by Wulff (1954). He was able to demonstrate the following differences:

(1) The spadix becomes shorter and broader with increasing polyploidy, although the number of flowers is constant.

(2) The angle of insertion of the spadix to the leaf is smallest in the diploids ~~(20°~~ (ca. 30°), a little larger in the tetraploid (ca. 35°), but considerably larger in the triploid (ca. 50°).

(3) The diploids are more susceptible to draught than the triploids and tetraploids, so that they do not flower in dry sites. The triploid flowers equally well in dry and wet localities, while the tetraploid flowers later and forms smaller spadices in dry places than in wet.

(4) The pollen grains are distinctly smaller in the diploids than in the tetraploid.

(5) The leaves of the diploids are significantly narrower ~~than those~~ and shorter than those of the triploids and tetraploids, and they are also more acute. It is also remarkable that while the tips of the leaves of the diploids and triploid are more or less straight, ~~those of the tetraploids are convex,~~ ~~with the~~ the upper part of the leaves of the tetraploid is convex with the tip bent towards the convex side.

~~The present writers are able to confirm these observations by Wulff (l.c.).~~

(6) The diploid and tetraploid plants are fully fertile, while the triploids are always completely sterile.

Although the diploids always differ from the polyploids in the characters mentioned, they are not identical. ~~The species A. gramineus~~ A comparison between material from Montreal and Copenhagen showed (Wulff, l.c.) that the leaves of the American plant are significantly shorter and broader than those of the plant from Copenhagen. The spadix of the Montreal plants is ~~[illegible]~~ thicker than that of the Copenhagen material, and although cultivated under the same conditions the American plants flower about three weeks later than the ~~Danish ones.~~ ones from Copenhagen. Also, while the last plants began to grow earlier than any other population in the spring, the Canadian specimens flowered last of them all. Wulff (1954) therefore concludes that in addition to *A. gramineus* there are two diploid taxa of *Acorus*, represented in his material by the Canadian and Copenhagen plants, respectively, and the population from Copenhagen is phylogenetically more closely related to the triploids and tetraploids than are the plants from America.

The two varieties of the triploid *A. calamus*, the typical race and var. *verus* from India, differ mainly in ~~the thickness~~ that the rhizomes are thinner in the latter, the spadix smaller and the leaves narrower. Wulff (1954) was able to demonstrate experimentally that these characters are strongly affected by the environment so that the typical race gets the thin rhizomes, the small spadix and the narrow leaves of var. *verus* when cultivated in warm greenhouses. ~~This is remarkable also in connection~~

3. Taxonomical conclusions.

Since Linnaeus (1753) described the species A. Calamus from Europe and India, where only triploid and sterile individuals are met with, there is no doubt as to the identity of the triploid with the Linnaean species. Its distribution area is shown in Fig.... Although this triploid has an exceptionally ~~large~~ wide area of distribution thanks to ~~an~~ original cultivation, it is questionable if it is correct to name it as a normal species. In fact, it is ~~so~~ more correctly classified as a hybrid (see later) and as such its name should be × Acorus Calamus L. Since its Linnaean varieties vulgaris and verus ~~as well as the~~ and var. angustifolius from Celebes (cf. Engler, 1905; Wein, 19..) are ~~more exactly pro~~ probably only ~~mod~~ climatical modifications, these should be dropped as unnecessary names.

The diploid species A. gramineus Sol. from southeastern China and southern Japan (Fig...) is a well-defined unit agreed upon by all taxonomists, so it does not need to be discussed closer.

~~The American diploid~~

The diploid plants studied by Wulff (l.c.) from Copenhagen are more closely related to the triploid specimens than are the diploids from America and A. gramineus. Most probably they are ~~also~~ identical to the southeast Asiatic species ~~A. tonkinensis~~, A. cochinchinensis (Lour.) Schott, originally described as Orontium cochinense by Loureiro (1790), and clearly mistaken for A. calamus by Engler (1905 . . .), Wein (19 . . .) and others. It is evident from the statements by Mücke (1908) and Raunkiær (1895-1899) that the fertile diploid was grown as early as 1895 in the Botanical Garden in Copenhagen and had been grown there so long that Raunkiær probably did not know of its origin. All wild Danish plants of Acorus are sterile and triploid. It is not unlikely that the fertile diploids in question have been grown from seeds from ~~Cochinchina brought~~ Southeastern Asia brought back by some Dane sailing with some of the ships of the Danish East-Asiatic Company. Since the Botanical Garden was moved ~~to~~ in about 1875 (cf. Lange, 1875) it is perhaps most likely that the plants had not grown in Denmark for more than 20 years when they were first studied by Raunkiær (l.c.). The distribution area of A. cochinchinensis is indicated in Fig. . .

Since the diploid plants from North America are as clearly separated from both the other diploid taxa, as they differ from the triploid, ~~it~~ they should be separated as a species. As such its correct name is A. americanus (Raf.) Raf. as described and transferred by Rafinesque (1828, 1836). The name A. verus used ~~by Houttuyn (17..)~~ is invalid, because . . . In its northern area the species is rather uniform, and the present writers have been unable to find any evidences for the occurrence of sterile specimens (cf. . . .

) or any other indication of a mixture

with supposedly introduced European plants, even from the region indicated by Merrill (1954). Hence, this is the only species of the genus in eastern North America.

In the southern regions of the continent there are two taxa described by Rafinesque (1838 and earlier) as species. From scanty seed material of both these plants it was possible to state that their chromosome number is diploid. There are also indications of hybridization between these populations and the typical race of the American _Acorus_, ~~so that despite their fairly distinct morphology~~. ~~Both differ in size and flowering time from the more northern~~ taxon, Both flower earlier than the northern taxa and both are considerably ~~taller~~ shorter, but while _A. floridanus_ is broad-leaved with a short and almost triangular scape and medial spadix, _A. flexuosus_ is very narrow-leaved ~~and~~ with a long and flexuose triangular scape and medial spadix. Since these taxa are certainly not separate species but morphologically distinct geographical races of a minor importance, the present writers propose for them the rank of varieties only of the species _A. americanus_: _A. americanus_ (Raf.) Raf. var. _flexuosus_ (Raf.) Löve & Löve, var. nov., fundatum super _Acorus flexuosus_ Rafinesque 18... in Antikon botan. 1(?), and in Fl. tex. 29 (cf. Rafinesque, 1836), and _A. americanus_ (Raf.) Raf. var. _floridanus_ (Raf.) Löve & Löve var. nov., fundatum super _Acorus floridanus_ Rafinesque 1836 in New Flora of North America I, p. 57.

with supposedly introduced European plants, even for the region indicated by Merrill (1954). As far as can be seen this is the only species of the genus met with in northeastern America.

Although the northern and eastern representatives of A. americanus are rather uniform and show but small variations in characters of systematic interest, southern and southeastern material may be distinct. Rafinesque (1836, 1838, and earlier) separated the southern race as the species A. flexuosus Raf. on basis of its smaller size, the much earlier flowering, the narrow leaves, and the long and flexuous triangular scape and medial spadix, but the southeastern plant was named A. floridanus Raf. on basis of its small size and vernal flowering, the broad leaves, and the short and almost triangular scape and medial spadix. Since the present writers have not studied living material of these taxa, and, thus, have not been able to perform any hybridization experiments with them and the more northern species, a more detailed evaluation of their taxonomical position cannot be attempted at present. There are, however, morphological indications of their diploid status, and, in the view of the conditions in Asia, further studies may well reveal that they are species of the same distinction as are, e.g. A. gramineus and A. cochinchinensis.

12.

The tetraploid number (2n = 48) has been reported ~~for~~ by Wulff (l.c.) as well as by some Japanese scientists. Wulff (1954) advocated the opinion that his tetraploid plants were identical with <u>A. Calamus</u> var. <u>spurius</u> (Schott) Engler, which is <u>A. spurius</u> Schott, while the Japanese tetraploid was named as <u>A. asiaticus</u> Nakai by Ito (1942). As far as can be seen from the descriptions – the present authors have had no identical living material for observation – both these taxa are distinct, although close experimental studies may perhaps reveal that they are stronger separated geographically than biologically ~~and~~ so that they would be more correctly classified as two subspecies of the same tetraploid species.

The Japanese and eastern Asiatic taxon (cf. Fig...) was ~~first~~ named as <u>A. asiaticus</u> by Nakai (1936) so that its epithet should be ~~asiaticus~~ { ~~but~~ The other tetraploid, which has a more northern and western distribution (Fig...) reaching perhaps all the way to eastern Russia with an outpost in Galicia (~~[illegible]~~) (Zapalowicz, 1906; cf. Wein, 1939; the locality is not on the map in Fig...), was named <u>A. spurius</u> by Schott (1859). Its correct name is, however, <u>A. triqueter</u> Turcz., since Turczaninow (1831) described it under that name, which was republished by Besser (1834), Ledebour (1853), and Schott (1860).

→ but since its identity with <u>A. Tatarinowii</u> Schott described from the regions near Peking by Schott (1859) cannot be doubted, the name <u>A. asiaticus</u> cannot be retained, despite its appropriateness.

The triploid number of chromosomes reported by Wulff (l.c.) and others from Europe and India, is characteristic of the plant originally named as <u>A. Calamus</u> by Linnaeus (1753), and including both the Linnaean varieties <u>vulgaris</u> and <u>verus</u>. This is a sterile plant introduced to Europe from Konstantinopel about 400 years ago, and probably cultivated in India for a very long time. This old ~~[illegible]~~ and established triploid owes its distribution to man, but its origin is still obscure. ~~It is hardly a hybrid between the diploid~~ ~~This~~ As shown by Wulff (l.c.) it is only remotely related to <u>A. americanus</u> ~~but closest~~ and <u>A. gramineus</u>, but closest related to the diploid he received from Copenhagen and which is here suggested to be identical with <u>A. cochinchinensis.</u> It is not very likely that it has been formed as a hybrid between this diploid and either of the tetraploid species. ~~and that~~ The meiotic conditions reported by Wulff (1940) with up to twelve trivalents per cell strongly indicate that it is an autotriploid which has been formed ~~occasion~~ from the diploid <u>A. cochinchinensis</u> sometimes in the past. ~~Such~~ Triploids are occasionally formed within all diploid species (cf. Löve, 1944; Bowden,), but they disappear soon in plants with sexual reproduction. When asexual reproduction is possible, however, the triploids can survive for an endless number of generations and even disperse to remote places by aid of different agencies, as is so well known from ~~Hemerocallis fulva (Belling 1925, Takenaka 1930,~~ Stout 1932, the likewise water plant Butomus umbellatus L. in northern Europe (Lohammar, 1932, 1954). ~~Another~~ The dispersal of the triploid must have been especially favoured by the fact that it is considerably richer in oils than is the diploid, while ~~it~~ this would not have been an advance had it been produced in a region where the tetraploids grows, since they are still richer in the aromatic oils. ~~It is concluded that~~ Since a triploid always must be regarded as a hybrid even when produced by autoploidy within the same species, it seems to be most correct to indicate its impure status by listing it as X A. Calamus ~~L.~~ with the explanation that it should be regarded as ~~a~~ a sterile autotriploid of A. cochinchinensis.

Summarizing the taxonomical remarks it can be concluded that the genus Acorus includes at least eight different taxa, but not only two or three as usually indicated in manuals. Five of these taxa are diploid, one is a sterile autotriploid, while two are tetraploid. Out of the diploids two species are indigenous in ~~eastern~~ Southeastern Asia, while the other three taxa are ~~North A~~ eastern North America. They are morphologically so distinct from the Asiatic diploids that there can be no doubt that they ~~belong to a diff~~ are specifically different, but ~~the~~ lack of experimental makes it impossible at present to decide, if the three American taxa ~~are species~~ belong to three different species or are only three geographical races of the same taxon. ~~only~~ The autotriploid should be classified as a hybrid though carrying its specific name, while the two tetraploids probably are to be regarded as good species.

For the sake of clarity, the synonymy of the different taxa of the genus _Acorus_ is given below.

För Acorus-sorjen:

jf. Helm, 1955: om Lactuca sativa
i Die Kulturpflanze 3, s. 38 —

X Acorus Calamus L. 1753. s. str. 2n = 36

Syn.: A. Griffithii Schott 1858, p. 351.

~~A. nilaghirensis Schott 1859, p. 101 (= v. verus)~~.

A. verus Garsault 1764, 1767; ~~non Houttuyn~~

A. aromaticus Gilib. 1792, p. 507.

A. Calamus-aromaticus [Clairv.]. p. 104.

A. Cania Bertol. 1864, p. 310,

A. elatus Salisb. 1796, p. 263.

A. europaeus Dum. 1827, p. 162,

A. Griffithii Schott, 1858, p. 351,

A. odoratus Lam. 1778, p. 299.

A. terrestris Spreng. 1825, p. 118.

A. undulatus Stokes, 1812, p. 282.

A. verus Raf. 1828, p. 26., ~~non A. verus Houtt. 1777, p. 399.~~

var. verus L. 1753, p. .

? A. Belangeri Schott, 1864, p. 284,

? A. commutatus Schott, 1860, p. 578,

A. nilaghirensis Schott, 1859, p. 101.

A. gramineus Soland. in Ait., 1789, p. 474. 2n = 24

A. humilis Salisb., 1796, p. 263.

A. pusillus Siebold, 1830, p. 2.

A. cochinchinensis ~~Schott~~ (Lour.) Schott, ~~1832~~ 2n = 24
in Schott & Endlicher, 1832, p. 22.

Orontium cochinchinense Loureiro 1790, p. .

A. triqueter Turczaninow 1831, p. Schott 1860. 2n = 48

A. spurius Schott 1864?, p. 284.

? A. angustifolius Schott, 1864?, p. 284

A. Tatarinowii Schott 1859, p. 101 2n = 48.

A. asiaticus Nakai ~~&~~ 1936, p. 105.

A. americanus (Raf.) Raf. 1836, p. 57.

A. Calamus var. americanus Raf. 1828, p. 25.

A. verus Houttuyn, 1777, p. 379, non Gaertner 1764-67.

A. flexuosus Raf. 18... , p. 178? (Atl. Jour.).

A. angustatus Raf., 1840, p. 196.

A. floridanus Raf. 1836, p. 57.

H. W. Schott: 1864: Araceae. Pars altera. —
Ann. Mus. Bot. Lugduno-Batavi 1, pp. 278-285.

p. 284: Acorus Linn.

1. Acorus commersonii Schott. Phyllodiis....; spadici digitiformi, 2½ pollices metiente; spatha 17-18 pollicari, basin versus e longinquo angustata, medio 4-5 lineas lata, apice subacuminata, rectiuscula; ovulis paraphysibus longulis praeditis, exostomate ovuli modice fimbriato, endostomate prominente quoque modice fimbriato.

Ab Acoro Calamo differt: spatha breviore basin versus longe angustata, ovuli endostomate prominulo, fimbriis modicis. In posterum recognoscendus.

Hab. Borbonia: Commerson.

2. Acorus spurius Schott. Phyllodiis latiusculis; spadice iuliforme subultrasesquipollicari; spatha spadice duplo et ultra longiore apicem versus sensim dilatata, acutata; ovulis paraphysibus longioribus circumsessis; exostomate et endostomate longe exserto longule fimbriatis.

Phyllodium latitudine ultrasemipollicare. Spatha paullo sub apice 4 lineas lata. Spadix 3-4 lineas crassus.

Ab Acoro Calamo iam brevitate spathae distinguitur.

Hab. Iaponia: Bürger

3. Acorus Belangeri Schott. Phyllodiis (omnibus?) brevibus, 18-20 pollices longis, acuminatis; spadice digitiformi - coroideo vel conico-digitiformi, subtripollicari; spatha 11-12-pollicari, leviter retrocurva, e longinquo e suprema parte, basin versus sensim angustata, paullo sub apice repentino acutato 5 lineas lata; ovulis paraphysibus longulis comitatis; exostomate ovuli longule fimbriato, endostomate longe exserto pariter fimbriato.

Spatha praecipue distinguitur. An species legitima?

Hab. Pondichery: Bélanger.

Over!

4. Acorus angustifolium Schott. Phyllodiis gramineis angustis elongatis; spadice tereti sesquipollicari; spatha subnovempollicari; ovulis paraphysibus inferioribus breviper, superioribus longissimis obtectis; exostomate ovuli modice fimbriato, endostomate longe exserto breviter denticulato-fimbriato.

Folia sive phyllodia 18 pollices et ultra longa, 2-2½ lineas lata, acutata, infima 7-8 pollices longa, fere 3 lineas lata. Pedunculus 9-10-pollicaris, spatha 9-pollicari leviter retro-arcuata superatus. Spadix sesquipollicaris longitudine, trilinearis crassitie.

Hab. Java?

Observ. Accedit ad A. nilaghirensem et angustia phyllodiorum ad gramineum, sed a priore spatha longissima excavato, ab altero spadice subulato donato, satis differre videtur.

(Is this a triploid or A. gr—?)

~~Among the host of problems in the forefront~~

One of the many challenging problems in the forefront of American botany is connected with the taxa of eastern North America which are closely related to plants of eastern Asia but unknown from the American west. The problem was first grasped by Gray (1840, 1846 . . .) in connection with his studies on Japanese plants, but although it was later discussed by ~~distingui~~ other distinguished geobotanists, like Berry (1927), Cain (1944), . . .

Rafinesque C.S.: New Flora of North America. I, Philadelphia 1836.

p. 57: Acorus, well known Genus, which I have increased to 6 species.

1. A. verus of Asia. 2. A. gramineus of China.

3. A. Europaeus in med. fl. page 2, with three American species.

1. A. americanus Raf. med. fl. fig. 1. Leaves and scapes broad gladiate, scape longer; spadix submedian lateral, capsules oblong acute. — From Canada to Missouri and Virginia. Estival, 2 or 3 feet high.

2. A. floridanus Raf. A. calamus Elliot &c. Leaves broad gladiate longer, scape shorter, triangular, one side concave, summit gladiate; spadix near the end, stamens exserted capsules oval obtuse. — Florida to Carolina. — Scape only one foot high, fl. vernal.

3. A. flexuosus Raf. fl. tex. 29. Leaves gramineform narrow shorter, scape longer flexuose triangular, one side concave, and like leaf; spadix medial. — Texas to Tennessee, dwarfish, one foot high, vernal. Autikon rar. lc. n. sp.

Medical Flora; or Manual of the Medical Botany of the United States of North America. Vol. 1, 2. Philadelphia. 1828-30

Elliot S. [A Sketch of the] Botany of South-Carolina and Georgia. I-II Charleston 1821-24.

1

Acorus L. 1753, p.

Perennial herbs from stout rhizomes, which are horizontal and nearly cylindrical, jointed and rugose, the joints 1-3 cm long, the rhizome itself up to ~~200~~ 150 cm long, white, with rings of brown and rose and triangular shades; its inside is spongy; spreading from its upper side are hairy dark-brown fibres, while bunches of coarse and white rootlets grow downwards.

Leaves are radical, and crowded, sheathing at the base, erect, ~~linear and flat above~~, smooth, linear, from 20-200 cm long, flat above, with the midrib usually a little off center; ~~the end is~~ acute to obtuse, but is usually three-angled.

The ~~stems are~~ scape resembles the leaves, and prolongs into an erect, and green, leaf-like, spathe of various lengths, ~~there or above~~ above the solitary spadix.

The spadix is elongate, oblong, cylindrical, 5-20(?) cm long, usually diverging laterally from the scape, somewhat tapering towards both ends, but obtuse. ~~On it are yellowish flowers crowded spirally.~~ The flowers are perfect, completely covering the spadix. Perianth of six short, and truncate segments. Six stamens with thick but linear filaments and broadly reniform bilobe anthers. The ovary is 2-3 celled, gibbose(?) and oblong, with sessile stigma. The fruit is an oblong or obpyramidal capsule with a few slender seeds.

Florissant beds of Colorado, from Oligocene

(mera än 30 miljoner år

enl. timescale „B" of Holmes (1933?), cf. Zeuner, p. 310).

probably about 30 million years ago.

Knowlton: Miocene?

cf. Cockerell, 1910: American Naturalist 44: Miocene trees of the Rocky Mts.

574.05: A512

Berry: (Lower Eocene)(SE USA): US. Geol. Surv. Prof. Paper 91, (1916): 1–481.

– (Middle & Upper E.) – 92, 1924: 1–205

– The flora of the [illegible] formation: – 154, 1929: 129–135

– ([illegible] formation) – 154, 1929: 225–264

– (Lower Eocene SE USA) – 156, 1930: 1–196

– The past climate of the north polar region: Smiths. Inst. Misc. Collect. 82, 1930 (6): 1–29.

Axelrod, (Ecogeny in Tertiary paleosol.) Natl. Acad. Sci. Proc. 1941, 27: 545–551. P 506: N21

Chaney, Tertiary forests and continental history. – Geol. Soc. Amer. Bull. 1940, 51: 469–486. P 550.5 6-[illegible]

~~– (Forests and continental drift).~~ – Sci. Monthly, Dec. 1940, 489–499. Sci. P. 505 S45

Chaney & Elias: Late Tertiary floras from the High Plains. – Carnegie Inst. Wash. Publ. 1936, 476: 1–72.

(See other references till Oregon [illegible]: Cain, p. 107). P 506 C21

Berry: et alii: 1927: Theory of continental drift. A symposium.

Am. Assoc. Pet. Geol.

– 1927: Bot. Rev. 3, 1(: 40–42).

~~Elias: 1935: Am. Journ.~~ Sci. 5th ser. Vol. 29: 24–33

Fernald 1931: Rhodora 33: 28–46

~~J~~ Matthew, 1906: (Continental Tertiary): Bull. Am. Mus. Nat. Hist. 22: 359–361.

– 1939: Climate and evolution. – N.Y. Acad. Sci. Spec. Publ. Vol. 1: 55–56.

Merrill: Journ. Arn. Arbor. 1938, XIX, p. 322.
(Acorus, was ~~[illegible]~~ Houttuyn).

Wein I.:

Acorus Calamus, ist „in Ostasien heimische Pflanze, die nach Europa und Nordamerika eingewandert oder eingeschleppt worden sein soll." (Engler, 1936, p. 149.

A. Engler, 1936: Syllabus der Pflanzenfamilien. 11. Aufl. Berlin.

~~A. de Candolle, 1855: Geographie botanique raisonnée:~~

Trimen, H. 1871: Is Acorus Calamus a native? - Journ. of Bot. 9: 163 —

Wein I

an var. spurius 1)

1) Engler (1905, S. 312: Araceae-Pothoideae. – Das Pflanzenr. IV. 23. B. Leipzig) hat sich für die ausgezeichnete Variante der Bezeichnung var. angustatus Besser bedient, nachdem von ihm (1879, S. 217: Araceae. – Monogr. phanerogam.; Suites au Prodr., II, Paris) zuerst die Kombination var. spurius (Schott) Engl. gebildet worden war. Die von Engler angewandte Namenklatur ist jedoch unzweifelhaft unanwendbar. Besser veröffentlichte in Flora XVII Bd. I, 1834, Beibl. S. 1 ff. eine Arbeit „Über die Flora des Baikals", wobei er sich in erster Linie auf eine von N. Turczaninow im 3. Hefte des VIII. Bandes der von N. Schtscheglof herausgegebenen russischen Zeitschrift „Der Anzeiger der Entdeckungen in der Physik, Chemie, Naturgeschichte und Technologie" im Jahre 1831 gelieferte Abhandlung stützte. Turczaninow hatte in diesem Aufsatze, auf den zu verweisen selbst einem Ledebour (1853, S. 12, 13: Flora rossica IV, Stuttgartiae) nicht möglich gewesen war, nach Besser (a.a.O. S. 26) einen Acorus triqueter veröffentlicht. Zu seinem Aufsatze lieferte Besser dann „Verbesserungen", die aber wegen des vorgeschrittenen Druckes nicht mehr eingeschaltet werden konnten und daher in extenso abgedruckt worden sind. Im Rahmen dieser „Nachträge zur Enum. plant. Baicalensium" findet sich (a.a.O. S. 30) die Bemerkung „Acorus triqueter est A. Calamus var. angusta". Eine var. angustatus ist somit von Besser nicht publiziert worden und sollte nicht einmal publiziert werden. Es bleibt daher nichts anderes übrig, als die Bezeichnung var. spurius zu verwenden.

Wein I:

Die Gattung *Acorus* besteht aus einem Artenpaare, *A. calamus* und *A. gramineus*, der westlichen Komponente *A. calamus*, und der östlichen Komponente *A. gramineus*. Die Differenzierung in diese beiden Arten hat sich zweifellos parallel den geologisch-klimatischen Änderungen vollzogen, deren Schauplatz der alte, aus bis in das Kambrium zurückreichenden Schichten aufgebaute Rumpfkontinente des seit dem frühen Paläozoikum nicht mehr vom Meere bedeckten Angaralandes bildete. Infolge Änderungen in den geomorphologischen und klimatischen Verhältnissen der Pliozänzeit bildete sich eine vollkommene Isolierung und Trockenlegung des Hanhai heraus, so dass das Verbreitungsgebiet der ursprünglich einheitlichen, mit einer stärkeren Variationstendenz begabten Art zerrissen wurde. Unter dem Einflusse der klimatischen Differenzen und der Isolation im Vereine mit der Separation entstanden in dem durch die wiederholte Klimaverschlechterungen aufgespalteten präglazialen Lebensraume die morphologischen Verschiedenheiten, die sich bei der teilweisen Überschiebung der Areale der beiden systematisch-phyletischen Einheiten im östlichen Ostasien als ~~Art~~ artenscheidend erwiesen haben und die in einer markanten Weise von dem komplizierten Zustandekommen einer sexuellen Differenzierung [illegible]. Die Differenzierung muss bereits in einer geologisch weiter zurückliegenden Epoche erfolgt sein, da *A. calamus* als [illegible] Type während des Pleistozäns auch in Nordamerika lebte. Sie hatte aber nur dadurch eine Möglichkeit gefunden, nach dem Norden der Neuen Welt zu gelangen, weil durch die seit dem Pliozän existierende Beringbrücke eine Verbindung zwischen Ostasien und Westamerika hergestellt war und durch die in diesem Abschnitte der Erdgeschichte einsetzende und besonders im Diluvium sich auswirkende Klimaverschlechterung starke Impulse zu intensiven, durch die meridional verlaufenden nordamerikanischen Gebirgsketten begünstigten Florenverschiebungen von Westen nach Osten unter Passierung dieses Steglandes gegeben wurden und weil infolge des Abschlusses des Nördlichen Eismeeres von dem Pazifischen Ozean die Kaltwasserströme nur den Weg an der Nordküste der Landverbindung entlang nehmen konnten und die Südküste dementsprechend ein günstigeres Klima, als es der heutigen geographischen Breite entspricht, besass. Der Einbruch polarer Wassermassen, der beim Absinken der Landbrücke naturgemäss erfolgt war, führte zu einer Verlegung der Arealgrenzen vieler früher asiatisch-amerikanisch stärker verbreiteten Pflanzenarten um einige Breitengrade nach Süden, die sich aller Wahrscheinlichkeit nach auch auf *A. calamus* erstreckt hat.

Wein. I.

Die Anschauung, dass die var. *vulgaris* im Himalaja das Ursprungs- und Ausgangsgebiet ihrer Expansion besessen hat und dass sich ihr Areal bis in die tiefen Regionen des Alpenlandes im westlichen Teile von Ssetschuan und Jünnan erstreckt, findet eine weitere Stütze in den morphologischen Charakteren und in der topographischen Lage des Lebensgebietes einer weiteren geographischen Variante, der var. *spurius*. Sie zeichnet sich durch schmale 0,5 bis 0,8 cm breite Blätter, und meist zartere, 3 bis 6 cm lange und 0,6 bis 0,7 cm dicke Blütenstände aus und bewohnt ein durch seine teilweise Kontinentrandlage ausgezeichnetes Gebiet, das im Norden bis Sibirien (Altai, Irkutsk und Dahurien) und im Süden bis in die mittelchinesische Tiefebene (Shanghai) reicht und auch Japan mit einschliesst, bildet also das ostasiatische Gegenstück zu der südasiatischen var. *verus*. Die auf ein bestimmtes Umwelt-Umgebungs-Verhältnis eingestellte und eine bessere Ökonomie und Ausnutzung des Energieumsatzes ermöglichende var. *spurius* zeigt in der Verkürzung und Verschmälerung des Blütenstandes, dessen Länge in gewissem Sinne als Masstab für die Dauer der Entwicklungsperiode gelten kann, deutlich eine Neuausprägung der Ganzheit . . .

Das Areal der var. *spurius* zeigt deutlich eine enge räumliche Verknüpfung mit den klimatisch und lage-bedingt gewesenen ostasiatisch-pazifischen Regionen, dessen Umgrenzung W. F. Reinig (1937, p. 50, Fig. 13: Die Holarktis, Jena) festgelegt hat und das während des gesamten Eiszeitalters von wesentlicheren Veränderungen verschont geblieben ist. Die gleiche räumliche Bindung weist auch das ostasiatische Teilareal der var. *vulgaris* unverkennbar auf.

Dis[illegible] pô s. 387 —

Wein I:

(Ein..)

A. calamus v. vulgaris zeichnet sich durch 1 bis 3 cm dicke Rhizome, 1 bis 2 cm, bisweilen jedoch auch nur 0.7 bis 0.9 cm breite Blätter, und 5 bis 8 cm lange und 1 bis 1,2 cm dicke Blütenstände und fehlschlagende Früchte aus. Sie wird in Ostasien seit geraumer Zeit, wie auch H. N. Ridley (1930, S. 65) (The dispersal of plants throughout the world) hervorgehoben hat, kultiviert, so dass sie an vielen Stellen unter wechselnder Gunst der Naturformationen und Naturverhältnisse nur als Überbleibsel eines früheren Anbaues oder als Flüchtling aus älteren Anpflanzungen vorkommt.

Sterilität meist [illegible] Kriterium, so Mücke (1908) [illegible].
[illegible]

Alle Araceae-Pothoideae sprechen einen für endozoochore mit Säuglern (Ridley), obwohl das Verzehren seiner Beeren durch diese Tiere bisher noch nicht beobachtet worden ist ...

Wein I.

Die Südgrenze der var. vulgaris verläuft durch das gleich, den übrigen Sundainseln mit einem ozeanischen Tropenklima ~~[illegible]~~ begabte Java, wo die Pflanze schon von Fr. Junghuhn im mittleren Teile der Insel auf der 2000 m hohen Dieng-Hochebene in einem heute reliktären Vorkommnis am Ufer der Seen gesellig angetroffen worden ist.
Inte på Sumatra.
Tror den kommit från Nil Girifjällen, Khasiafjällen, eller Himalaya. Man säger sedan att i norra Indien och Dekan ~~fjällen~~ är endast var. verus (= Nil Giri = Khasia).
Därför endast Himalaya möjligt som ursprung för var. vulgaris.

Siegagen,

A. calamus findet sich nun in Tat im extratropischen Himalaya (Kumaon, Naphot), in Nepal und Bhutan, um von dort aus ostwärts bis nach Hinterindien (Assam) vorgedrungen.
Tror den kommit från Himalaya.

Wein I.

... die nach Engler (1905, S. 372) bisher von Celebes bekanntgewordene var. angustifolius Engl. (1879) mit verlängerten, stark verschmälerten, 0,4 bis 0,5 cm breiten, mit deutlicher Mittelrippe (Unterschied von A. gramineus) versehenen, im ganzen also gleichfalls Kriterien der Juvenilität an sich tragenden Blättern, da ihr Sammler Koorders (1911, S. 253; ~~S. H. Koord~~ S. H. Koorders, Exkursionsflora von Java, Jena) die von ihm aufgenommenen Exemplare ausdrücklich als kultivierte bezeichnet hat.

..... Die ~~W~~ Wohnzone der var. vulgaris stellt in ihrer gegenwärtigen Umgrenzung zweifellos ein zusammengeschrumpftes, ökologisch einigermassen einheitliches Areal dar, das mit dem einstigen Ursprungsgebiete oder wenigstens mit einem in einer früheren Zeitphase der progressiven Vergrösserung des Ausstrahlungszentrums erreichte Stufe übereinstimmt.

... Ausser einer von H. Glück künstlich erzeugten Wasserform (f. submersa Glück) ist nur von H. Zapałowicz (Conspectus Florae Galiciae, I, 1906, S. 248) wie in zahllosen anderen Fällen ohne alle Berücksichtigung der Literatur, aus Galizien eine var. angustifolius unterschieden worden, die sich jedoch keinesfalls mit der gleichnamigen, von Engler bereits 1879 aufgestellte Variante deckt. Diese var. angustifolius Zapał. mit ihren 5 bis 6,5 mm breiten Blättern und ihren 6,5 cm langen und 7 mm breiten Kolben lässt sich zweifellos am ehesten mit var. spurius vergleichen und ist anscheinend mit ihr identisch. Eine Nachprüfung ist aber unbedingt erforderlich, da die var. spurius auf europäischem Boden sonst nirgends aufgefunden werden konnte.

Wein I.

. . . Wenn der in Nordamerika ausgestorbene A. Calamus, der ihrer Fertilität verlustig gegangenen var. vulgaris entsprochen hätte, dann würde ein solches Vernichtetwerden in der Endphase einer längeren Entwicklungsperiode etc. . . .

var. spurius helt okänd från Europa (p. 335). Sannolikt på grund av stepparnas torka.

. . G. Samuelsson (1934, p. 108): A. Calamus „sich selbständig nur in vegetativer Weise innerhalb eines und desselben Wassersystems ausbreiten kann".

. . . Flora SSSR talar inte om tattarernas införsel, endast — Prag etc. fr. Konstantinopel, stundom i var. spurius.

. . . Är ennt införd till Polen av tartarerna, trots många referenser. („Tatarskie ziele"). Sannolikt [illegible] uppslag, som ger ursprungs-rötter.

. . . – –

A. Calamus har inte införts på Medeltiden, men han fört till Konstantinopel, som stod i spetsen för kulturen från c. 1200–1500 a.c. Kom från Indien, över Hindukusch, Sejidkutor [?] o Armenien, Inte spontan i Kleinasien.

Wein III :

Die Tatsachen in der Verbreitung der verschiedenen geographischen Varianten von A. Calamus lassen bereits heute erkennen, dass die Beziehungen zwischen den chromosomalen Verhältnissen und den morphologisch-physiologischen Eigenschaften der Art keineswegs als eindeutig klar gelten können. Die Ausführungen von H. D. Wulff (1940) liefern die besten Beweis für die Richtigkeit der damit ausgesprochenen Behauptung. Wulff hat ~~feststellt~~ festgestellt, dass bei sterilen Pflanzen aus Schleswig-Holstein und Indien, also Stücken der var. vulgaris und der var. verus, 2n=36, bei fertilen Pflanzen aus den Botanischen Gärten zu Kopenhagen und Leningrad, deren Zugehörigkeit zu einer der Varianten der Art von ihm nicht dargetan wurde, 2n=24 und 2n=48 beträgt. Die Ungleichheit der Chromosomenzahlen mit der Verschiedenheit der Varianten von A. Calamus in kausale Beziehung zu setzen, hat Wulff somit vollkommen unterlassen. . . . . .

Den geografiska isoleringen visar att var. är [illegible] [illegible].

Triploidien är inte någon sterilitetsorsak (hur får han det av Wulff??)

Det måste vara fel, att [illegible] av Acorus [illegible] i Leningrad 1708, Linnés [illegible], etc. [illegible] D. t. Garden sedan 1703

Bleibende Erfolge kann die zytologische Forschung daher allein dann erzielen, wenn sie Hand in Hand mit einer Systematik arbeitet, die als „Synthese der Gesamtbotanik" auf eine möglichst breite und feste Grundlage gestellt worden ist und damit auf die Schaffung grösserer Zusammenhänge abzuzielen vermag. Eine solche innere Festigkeit und Geschlossenheit kann der Systematik aber nur dann zuteil werden, wenn sie das geographische Prinzip weitgehend zur Anwendung bringt . . . .

Wein III:

Als unbestreitbares Verdienst der Darstellung von Wolff muss es demgegenüber gelten, dass ihr Verfasser A. calamus, der Arbeit von Buell (1937) folgend, als eine auch im Atlantischen Nordamerika indigene Pflanze angezeigt hat, weil sie dort, was selbst dem Monographen A. Engler unbekannt blieben ist, in fertilem Zustande in grösserer Verbreitung vorkommt. Das Areal des fertilen A. calamus weist die gleiche enge räumliche Verknüpfung mit den diluvialen Refugialgebiete auf, wie sie sich an verschiedenen Stellen Süd- und Ostasiens findet und wie sie bei zahlreichen anderen arktotertiären Arten des Angarakontinentes in Nordamerika (Thuja occidentalis, Taxodium distichum, Fagus americana, Liriodendron tulipifera, Liquidambar styraciflua, Sassafras officinalis u.a.m.) wiederkehrt. A. calamus gehörte somit nicht nur bis zum Pleistozän zu den amphipazifischen Arten, sondern zählt auch noch in rezenter Zeit zu ihnen, konnte also trotz der grossen Ausdehnung der glazialen Eiskalotte und der dadurch hervorgerufenen und durch den Mangel an ostwestlich streichenden Gebirge ermöglichten starken Verschiebung der Florenareale nach Süden im östlichen Teile des Nordamerikanischen Waldgebietes die Eiszeit überdauern, ohne dabei der Fertilität verlustig zu gehen. In dem ~~räumlichen~~ raumkleineren Westrefugium des Nordamerikanischen Waldgebietes hingegen fehlt A. calamus trotz der infolge ihrer glazialen Wannennatur zahlreiche Seen bergenden Täler des mittleren und nördlichen Felsengebirges und trotz der erst in der Postglazialzeit eingetretenen erheblichen Verlagerung der Trockengrenze nach Norden und der ersten damals erfolgten grundlegenden Änderungen der pluvialen Verhältnisse des Diluviums, offenbar weil es infolge des durch das Absinken der Beringbrücke hervorgerufenen Einbruches polarer Kaltwassermengen und infolge der Nachbarschaft der Steppen- und Wüstenregion in den von Hochgebirgen umwallten Hochländern mit ihrer an die Oberflächengestaltung Zentralasiens erinnernden geomorphologischen Gliederung und in dem sich auf einer Steppenbasis erhebenden und vielfache Spuren ehemaliger Vergletscherung aufweisende Waldgebirge der Rocky Mountains der Pflanze nicht die notwendigen Überdauerungs- und Durchsetzungsmöglichkeiten darzubieten vermochte. . . . .

Wein, III:

... Sowohl steriler als auch fertiler A. Calamus bilden, chorologisch gesehen, paläogeographisch und neogeographisch bedingte und beherrschte Erscheinungen und damit die Endergebnisse aller paläogeographischen und neogeographischen Vorgänge, von denen die von ihnen bewohnten Areale im Laufe der Zeiten einschneidend umgewandelt und umgestaltet worden sind.

Wein III.

Die ursprüngliche Heimat des fruchttragenden A. Calamus (s. strict.) hat im westlichen in Süd- und Südostasien gelegen. Im Zusammenhange mit der bereits vor dem Untermiozän in Erscheinung tretenden Hochschaltung der heutigen hochasiatischen Landscholle in einer Reihe von Faltungsphasen zu einer kompliziert gebauten Gebirgsfestung und der schon im Pliozän einsetzenden Klimaverschlechterung ist die Pflanze auf Grund eines den Ablauf der Lebensvorgänge beherrschenden einheitlichen und zielstrebigen Prinzipes nach Massgabe der zu der Umformungszeit herrschenden Bedingungen nicht in graduellen Abstufungen, sondern in genereller Differenzierung steril geworden .... och har sedan kommit invandra under [illegible]. Utan människans hjälp kunde den inte ha utvidgat arealen till Europa. – Och det gjorde turkarna. Från Indien, eller att komma den vild: Kleinasien.

Det faktum, att två olika typer förekommer i Indien, kan tyda på att Indien endast är sekundärt hem för arten, men östra Asien originalhemmet.

.. Arealerweiterung von A. Calamus vom südöstlichen Asien aus über Indien nach den Gegenden nördlich und südlich um das Schwarze Meer wären vielmehr. - - - . just omöjliga på grund av geografien.

Införandet av A. Calamus från Indien över Konstantinopel till Prag och Wien erfolgte in der Renaissance - -.

Kom till Österrike 1562, Holland 1575, Polen 1577, Tyskland 1579, Italien 1583, Frankrike 1586, England 1596, ~~Dan~~ Danmark 1642, Sverige 1658, Portugal 1661, Finland 1673, Elsass 1691.

A. Hayek: Allgemeine Pflanzengeographie, 1926: s. 304:

A. Calamus: „Eurasien bis in die Tropen, Insel Bourbon, Nordamerika" (utan att skilja på proanthrop och synanthrop).

Biblioteket:

Ring Lenkins!

Brøndsted:

Norsemen in North America before Columbus –

Smithsonian Report for 1953, Wash. 1954.

Paleobotaniske lister?

~~Eller skriv till Chaney for oplysninger.~~

Dr. R. W. Chaney,
Dept. of Paleontology,
Univ. of Calif.
Berkeley 4, Calif.

Frère Marie-Victorin, 1931: Les Spadiciflores du Québec.
Tertiary fr. Colorado:
A. affinis Lesquereux; A. brachystachys Heer.
Pleistocene fr. Kentucky: A. Calamus.

Bröndsted:

Norsemen in N. Am. before Columbus.

Smithsonian Rep. for 1953, Wash. D.C. 1954.

~~N.R.C. Report, last ed.~~
~~Comm. on Biol. P. 506~~

Palaeobotanical lists?

Acorus calamus fr. Kentucky, Pleistocene.

(Geol. Zentralbl.)

Bot. Abstr.

Bot. Zentralbl.

Endeavour: The Editor of E

Imperial Chemical Industries, Ltd.
~~Nobel House,~~ Millbank,
~~Buckingham Gate,~~ London, S.W. 1.
~~London, S.W. 1~~

Om möjligt
Vol. VIII, No. 49 & 50 etc.

without charge to senior scientists, etc.
Within these limits the Editors are at all times glad to consider the addition of new names to the mailing list.

The origin of the American Acorus.

For more than a century botanists have been aware of the close relationships between the flora of ~~that~~ eastern North America and that of eastern Asia, and several explanations of this phenomenon have been set forth since Gray (1840, 1846, 1856, 1859, 1860, 1873, 1878) first pointed this out (made attention?). . . . .

Many are the species in North America which have been identified with European material without any closer comparison with authentic specimens.

Rothmaler, S. 100 (unten):

Dobzhansky: „Tatsächlich ist aber keine Kategorie willkürlich, solange ihre Grenzen mit denen der diskontinuierlich ~~variierenden~~ variierenden Gruppen der lebendigen Formen zusammenfallen."

NB: Wulff, 1950, s. 161:

Utöver vad han säger där om Galizien-plantorna, finns indikationer i tidigare litteratur. Och om diploiden har införts till Polen med tattarna, och om de danska plantorna förts hemåt från Polen, är det kanske även sannolikt att diploiden i USA härstammat från där. ~~fr. Botaniska Trad~~ Botanisk Have? Och Hur gammal är varifrån kom tattarna i forntida land? Eller från östra Asien genom Österrikisk Ungern?

Wulff, 1954:

S. 529: Steriliteten har observerats i 400 år!

S. 532: var. spuria i Poland? Då passar det ej med USA.

Weiter III:

Th. Arldt. 1938: Die Entwicklung der Kontinente und ihrer Lebewelt. 2. Aufl. I. Berlin 1938.

Fedtschenko, B: Flora SSSR IV.

Reinig, F.W. 1937: Die Holarktis. – Jena
1938: Elimination und Selektion – Jena.

Samuelsson, G. 1934: Die Verbreitung der höheren Wasserpflanzen in Nordeuropa. – Acta Phytogeogr. Suec. V.

Strömberg: Theophrastus.

F. Hermann, 1939: Zur Abgrenzung der Gattung Poa und zur Gliederung ihrer europäischen Arten. – Hercynia 1: 451 – 461.
(Typ undestruktiv)

Sektionen: ~~[illegible]~~

Festucaster: P. violacea Bell. (= [illegible] Festuca).

Ochlopoa: P. annua L., P. balearica Porta

Bolbophorum: P. bulbosa L., P. timoleontis Heldreich, P. concinna Gaudin,

x/ Oreinos: P. alpina L., P. jubata A. Kerner, P. trichophylla Heldr. & Sart. P. ligulata Boissier, P. bivonae Parl., P. pumila Host, P. thessala Boiss. & Orph., P. parnassica Boiss. & Heldr., P. minor Gaud., P. laxa Haenke, P. abbreviata R. Br. 1823.

Macropoa: P. longifolia Trin.,

Leptopoa: P. flaccidula Boiss. & Reut.

xx/ Hylopoa: P. nemoralis L., P. compressa L., P. nemoralis L., P. balbisii Parl., P. glauca Vahl, P. palustris L. 1759, P. sterilis M.B.

Homalopoa: P. Chaixii Vill., P. remota Forsselles, P. hybrida Gaudin,

Pandemos: P. trivialis L., P. angustifolia L., P. alpigena Fries, P. pratensis L., P. annua All.

x/ P. alpina ssp. alpina (or. var.?)
ssp. media Schur 1853 ((Schur) Herm.?)
ssp. badensis Haenke 1793 ((Schur) Herm.?)
ssp. od. var. fallax F. Hermann.

xx/ P. nemoralis ssp. nemoralis
ssp. Rehmannii Richter 1890 (oder (Richt.) Herm.?).

Holmberg (1926) daher strukturell [illegible]. Oder Nomenklatur, [illegible]?

Cytotaxonomy of the American Acorus.

The collective species *Acorus Calamus* in its several taxa is of a widespread occurrence in North America and Eurasia and the adjacent tropics. The collective taxon is found in Europe from Russia westwards to the British Isles and Norway, south to the Balkans and the Alps and the Pyrenées, and north to ~~[illegible]~~ central Scandinavia and central Russia. In Asia it is distributed from Obish to the Soviet Far East and Japan, south to (Altai and) India and Java west to Caucasus and Asia Minor. And in North America the taxon is widely distributed from the Gulf of St. Lawrence, northern Manitoba and the Peace River District south to Florida and Texas and west to the Rockies in Alberta, Montana, Idaho, and Colorado. It grows in wet low places and ponds and exhibits a small variability over wide areas, although its subdivisions from different continents are substantially distinct.

As is the case with other plants with a wide distribution, several attempts have been made to divide the ~~Linnean~~ species *A. Calamus* into smaller and more restricted units. The first ~~such~~ attempt was made already by Linnaeus (1753), who distinguished two varieties: *vulgaris* from Europe and *verus* from India, the latter characterized by having narrower leaves, thinner rhizomes, and smaller spikes. The Indian ~~—~~ taxon was later raised to the rank of species by Garsault (1764, 1767), Houttuyn (1777), and Rafinesque (1828), while ~~and~~ Hooker (1894) was of the opinion that these differences were of no taxonomical value. This latter view is strongly supported by the experimental ~~cytogenetical~~ observations by Wulff (1954), who found these characters to be ~~st.~~ easily modified by high temperatures.

European material has been renamed by authors like Gilibert (1792), Schott (1856: . . . . 1860), Salisbury (1796), Bertolini (1864), Dumortier (1827), Lamarck (1778), Stokes (1812), and Sprengel (1825), but since ~~all~~ the European species ~~plant~~ cannot be subdivided ~~into more than one~~ with any reason, all these names are ~~only~~ synonyms of a historical interest only. Plants from southeastern and eastern Asia have been described as the species A. gramineus by Solander (in Aiton, 1789) and later also as A. cochinchinensis by Schott (186: ~~and~~ A. humilis by Salisbury (1796), and A. pusillus by Siebold (1830). ~~or A. asiaticus by Nakai (~~ ~~As~~ Eastern and northern Asiatic ~~material~~ specimens were named as the species A. triqueter by Turcz. . . . . (1842), A. spurius by Schott (185 . .), A. angustifolius (?) by Schott (18 . .), A. Tatarinowii (?) by Schott (1859), and A. asiaticus by Nakai (1936).

The American populations of Acorus are usually identified with the species A. calamus, and Engler (1905) and ~~Michx~~ Buchholz (1935) went as far as identifying them with the European var. vulgaris. Most authors seem to have accepted this view, although Rafinesque (1836) [Rafinesque 1828: A. verus!] described American plants under the names A. americanus and A. floridanus (Raf. later, (Rafinesque, 1840 . .) as A. angustatus and A. flexuosus.

Intensive studies on the history of *Acorus* in Europe performed by Mücke (1908) showed indisputably that the taxon has been introduced into central Europe about year 1575, when Loselius (1576)

Schott, H.W.
Prodromus :578, 579
1860

3. triqueter. Turczan. (in schedula Herb. Horti Petropol.) -- Phyllodium ultra vaginam longissime productum vix dilatatum, 4-5 lineas latum, sensim apicem versus angustatum, acuminatissimum. Spatha strictiuscule erecta, spadice 7-8-tuplo longoir, vix medio dilatala; exitu acuminatissima, inferne in stipitem triquetrum bipollicarem contracta. Spadix digiformis, 2 1/2 - vix tripollicaris. Ovarii loculamenta sub-6-ovulata. Ovuli exostoma fimbriis paucis, brevibus, latiusculis auctum, endostoma obsoletum. --Dahuria. Turczaninow.--v. s. specim. in Herb. Horti Petropol.

Schott & Endlicher
Meletemata Botanica : 22
1832

XLI. ACORUS L. Flores squamis 6 cincti. Ovaria 3 locularia, loculis sub 6 ovulatis, ovulis versus apicem axeos appensis. Stigmata 3 loba. Baccae (rubrae) 1 spermae.

Indicae, spadice solitario.

A. Calamus L. A. cochinchinensis Schtt. (Orontium cochinchinense Lour.)

Loureiro 1790

2 x

A. gramineus Soland. 1789
A. cochinchinensis (Lour. 1790) Schott 1832
A. americanus (Raf.) Raf. 1836
A. verus Houttuyn 1777, non Garsault 1764–87
A. flexuosus Raf. 1832?
A. angustatus Raf. 1840
A. floridanus Raf. 1836..
A. humilis Salisb. 1796
A. pusillus Siebold 1830

3 x

A. Commersonii Schott 1864 Bourbonia
A. Belangeri Schott 1864 Pondichery (Madras)
A. angustifolius Schott 1864 Java? — 3 x of A. gram.(!)
A. Calamus L. 1753
A. nilaghirensis Schott 1857 (India)
A. terrestris Spreng. 1825 (Indo-China) — 3 x of A. gram.?
A. Griffithii Schott 1858: Bhutan
A. verus Garsault 1764–87
A. aromaticus Gilib. 1792
A. calamus-aromaticus (Clairv.)
A. Casia Bertol. 1864
A. elatus Salisb. 1796
A. europaeus Dum. 1827
A. odoratus Lam. 1778
A. undulatus Stokes 1812
A. verus Raf. 1828
A. commutatus Schott 1860

4 x

A. spurius Schott 1864 Japan.
[A. triqueter Turcz. 1831 (Siberia) Schott 1860 Dauria, Dahuria]
? A. Tatarinowii Schott 1857 (Peking)
A. asiaticus Nakai 1936, Japan

30 names! Most of these names have been given to one form (triploid) which shows all signs of having been formed only once, and they are thus based on variations caused by environmental factors solely.

Trevelyan, 1837: Vegetation of the Faroe Islands. – Florence.

✓ Acorus angustatus Raf. Autikon Bot. 195 (1840): (? flavum) Alabama.

✓ A. asiaticus Nakai in Rep. First Sci. Exp. Manchoukuo, Sect. IV, IV, (Ind. Pl. Jehol.) 105 (1936): Manchur., Corea, China, Japan.

✓ A. verus Houttuyn Nat. Hist. II, VIII, 379 (1777), fide Merrill in Journ. Arn. Arb. 1938, XIX, 322, in syn. – A. Calamus

✓ A. verus Garsault (1764)(1767): A. Calamus.

✓ A. americanus Raf. New Fl. Am. I, 57. 1836

✓ A. angustifolius Schott, in Ann. Mus. Bot. Lugd. Bat. I, 284: A. Calamus. (c. 1860)

✓ A. aromaticus Gilib. Exercit. II, 507: A. Calamus, 1792.

✓ A. Belangeri Schott, Ann. Mus. Bot. Lugd. Bat. I, 284: A. Calamus.

✓ A. Calamus-aromaticus [Clairv.] Man. Herb. 104: (A. Cal.).

✓ A. Casia Bertol. in Mem. Acad. Sci. Bolog. Ser. II, IV (1864), 310: A. Cal.

✓ A. cochinchinensis Schott, Melet. I, 22: Cochinchina (c. 1860)

✓ A. commutatus Schott Prodr. 578: A. Cal. 1860

✓ A. elatus Salisb. Prodr. 263: A. Cal. 1796

✓ A. europaeus Dum. Fl. Belg. 162: A. Cal. 1827

✓ A. flexuosus Raf. New Fl. Tex. 29; Atl. Journ. 178: A. Cal. 1832?

✓ A. floridanus Raf. New Fl. Am. I, 57: A. Cal. 1836

✓ A. gramineus [Soland. in] Ait. Hort. Kew. ed. I, I, 474: Japan. 1789.

✓ A. Griffithii Schott, in Oestr. Bot. Zeitschr. (1858) 351: A. Cal.

✓ A. humilis Salisb. Prodr. 263: A. gramineus. 1796

✓ A. nilaghirensis Schott, in Oestr. Bot. Zeitschr. (1859), 101: A. Cal.

✓ A. odoratus Lam. Fl. Fr. III, 293: A. Cal. 1778.

~~A. Palmita Lichtenst. Reise II, 256: A~~

✓ A. pusillus Siebold, in Verh. Bat. Genoot. XII, 2 (1830): A. gramineus

✓ A. spurius Schott in Miq. Ann. Mus. Bot. Lugd. Bat. I, 284: A. Cal. 1859?

✓ A. Tatarinowii Schott in Oestr. Bot. Zeitschr. (1859), 101: A. Cal.

✓ A. terrestris Spreng. Syst. II, 118: A. Cal. 1825

✓ A. triqueter Turcz. ex Schott, Prodr. 578: A. Cal. (1860?).

✓ A. undulatus Stokes, Bot. Mat. Med. II, 282: A. Cal. 1812

✓ A. verus Raf., Med. Fl. I, 26: A. Cal. 1828

E. W. Berry 1937: Tertiary floras of eastern North America. — Bot. Review 3: 31–46.

p. 35: ...."the following genera had already attained a Holarctic distribution and were indigenous in southeastern North America at the beginning of Wilcox time: (late lower Eocene) (? late Paleocene)
... Acorus, Amygdalus, Aralia, Asplenium, Celastrus, Cinnamomum, Diospyros, Ficus, Fraxinus, Ilex, Magnolia, Myrica, Nelumbo, Nyssa, Platanus, Potamogeton, Prunus, Rhamnus, Smilax, Sparganium, etc.

– The Wilcox flora comes from over 130 localities scattered from Alabama to the Rio Grande, developed most extensively along the shores of the Mississippi embayment, which at that time flooded the Mississippi Valley northward to the mouth of the Ohio...."...

Acorus is not found in the Claiborne flora (Middle Eocene).

Wein III.

Rüegg, Kurt, 1936: Beiträge zur Geschichte der offiziellen Drogen Crocus, Acorus(?) Calamus und Colchicum. — Inaugural-Dissertation Basel, 1938.

(mest historisk-filosofisk?). Och felaktig historiskt.

Weiten III polemiserar mot Rüegg ganska kraftigt.

Wein filosoferar om "Sterilwerden des A. Calamus", samt tror detta skett under istiden, i Himalaja.

Kallar v. vulgaris = v. spurius "Temperaturklimaformen", v. [illegible]: Tropenklimaform.

En neodarwinistisk diskussion om sterilitetens utveckling, baserad på Jollos, V. 1939: Grundbegriffe der Vererbungslehre).

~~Cytotaxonomy of plants of~~

Chromosomes of Manitoba gymnosperms.

The American *Acorus* – its cytotaxonomy.

M. F. Buell:

Acorus Calamus in America –

Rhodora 37, 1935: 367–369.

Acorus Calamus: 188, 521, 1933, 5098.

Begära lån från herbarierna för den amerikanska utbredningen, snarast.

S. Killermann, 1919: Die Herkunft des Kalmus (Acorus Calamus L.). – Naturwiss. Wochenschr. N.F. 18: 633-637.

Tidig- litteraturcitat

J. Bot. Abstr. 8: 871

K. Wein, 1939: Die älteste Einführungs- und Ausbreitungsgeschichte von *Acorus Calamus*. [Erster Teil]. – Hercynia 1: 367–450.

1941: II. Teil: – Hercynia 3: 72–128.

1942: III. Teil.: Hercynia 3: 241–291.

(Mimeo.)

Rafinesque, C. S. 1828: Medical Flora; or, Manual of the Medical Botany of the United States of North America. II Vol. I.

S. 25 (Fig. No. 1 or A. Cal. v. amer.)

No. 1. Acorus Calamus.

Authorities: Linnaeus, Michaux, Pursh (Dispensaries) Schoepf, Woodville, Thatcher, Coxe, Swediaur, Bigelow's Sequel, W. Barton fig. 30 bad, &c. &c.

Genus Acorus – Spadix cylindrical with crowded flowers. Perigone single, six-parted persistent, Stamina six pericentric. Germen one, no style. Stigma punctiform. Capsule three celled, many seeded.

Species A. Calamus Var. Americanus – Leaves and stems sword shaped, ancipital, stems longer. Spadix cylindrical, obtuse, solitary, oblique, submedial lateral. Capsule oblong acute.

Description – Root perennial, horizontal, jointed, rugose, nearly cylindrical, from six to twenty-four inches long, joints from half an inch to an inch long, white, with triangular shades, or rings of brown and rose; the inside is spongy, and loses much by dessication; bunches of coarse fibres hang downwards, and hairy brown fibres spread upwards.

The leaves are all radical sheathing at the base, and variegated of white, rosey and green; they become flat above, green and smooth, with a ridge on each side in the middle, the end is very sharp, length from one to three feet. The stems are similar to the leaves; but commonly longer and bearing near the middle on one edge the spadix or thick spike of flowers.

Spadix solitary, oblique, cylindrical from one to three inches long, both ends tapering but obtuse. – Flowers small, crowded spirally on it, and yellow. Perigone with six equal and truncate segments. – Stamina six, filaments thick, anthers bilobe. – Germen one gibbose, oblong, stigma sessile, pointed. – Capsul oblong with many minute, slender seeds.

History – The genus Acorus is so perfectly natural that the few species belonging to it are hardly distinguished from each other. The Chinese Acorus (A. gramineus) has narrow leaves and the spadix nearly terminal. The Asiatic and Malabar species (Acorus) has a slender root and thin leaves. The European Acorus is deemed by all Botanists similar to the North American, and yet differs as much from it as the Chinese. The above specific character applies to our American variety or species: while the European plant may be distinguished by the following definition.

A. Calamus Var. Europeus – Leaves and stems sword-shaped, nearly equal, hardly ancipital. Spadix cylindrical, obtuse, oblique, lateral, often double. Capsule trigone obtuse.

These distinctions hardly amount to specific difference, and therefore the genus might properly be considered as having a single type, which being widely spread has undergone some variations in China, India, Europe and North America. This surmise will be confirmed by the habit of these plants, being perfectly identical, and all possessing the same aromatic smell and medical properties.

Smi'.

Namnet från grekiskan; trodde det var bra för ögonen.
Linné satte det: Hexandria Monogynia, men bör vara: Tribe Orontides or Typhides, intill släktet Orontium. It is like them an aquatic plant, growing of the borders of streams and ponds or meadows, ditches, &c. throughout North America, from Canada to Louisiana, east and west of the mountains, - : ...

The roots are the most essential part. They form an article of trade in China, Malabar, Turkey, &c. — In the early stage of the North American Colonies, it was exported to England; and is even now occasionally sent abroad. It might be carried to China where it is esteemed. It grows so copiously that there will be no need to cultivate it; but when it may become expedient to produce more, it will be very easy to raise it by planting slips of the roots in ditches and swampy grounds. .. The best time to collect them (the roots) is the spring and fall.

Hur äter den ej, noxious to insects. Leather can be tanned by the whole plant.
The blossoms appear in May or June; they are yellow and crowded on a thick spike or spadix.
Innehåller tannin, amarine, och en essential oil. Olja 1/2 %

Bitterna deemed stomachic, tonic, corroborant and carminative. Spirit eller den nauseous flavour, is rather pleasantly warm and bitter.

It is useful in disorders of the stomach, flatulency, vertigo, cholics, dyspepsia, &c; candied roots and the extract, or chewing the roots and swallowing the juice, are efficient in those cases. — The warm infusion like tea, cures the wind cholic of infants, sailors, &c.

The dose of the extract is half a drachm. When the root is masticated, a copious salivation is produced, which has cured the tooth ache. Children are fond of this root in many places, and may be indulged with it; the taste is spicy and pleasant. The candied roots are palatable and much used in Asia. — . . . . —

Henry calls this Acorus! and gives a bad figure of it.

Bigelow, 1822: Sequel to the American Pharmacopeia. — Boston?
— 1817: American Medical Botany. 3 vols. — Boston.
Coxe, 1827: American Dispensatory, 7th Edit. — Philadelphia.
Michaux, 1803: Flora boreali Americana. 2 vols. — Paris.
Pursh. 1815. Fl. Amer. Sept. 2 vols. London.
Schoepf. 1787: Materia Medica Americana potissimum regni vegetabilis. — Erlangen(?)

Merrill, E. D. 1954: The Botany of Cook's Voyages. —

Chronica Botanica 14, No. 5/6. . .

p. 282 (critique of Sauer: Agricultural origins and dispersals). :

1) Acorus calamus L. — The common sweet flag was introduced from Europe by our earliest colonists, arriving, very likely, in Jamestown in 1607 and in Plymouth in 1620; it may have been a Mayflower passenger, or it may have arrived, a few years earlier, at the French settlements in eastern Canada. It was, in turn, unquestionably introduced into Europe from Asia. The only other known species of Acorus occurs in eastern Asia. Once introduced here, it immediately established itself. It was in great demand in Europe, for various purposes, long before America was discovered,

and is one of the very easiest of plants to propagate from rhizomes.

(NB: rhizomes fr. N. Am. dog på väg till Wolff!)
(Har [illegible] ~~[illegible]~~ den till Pleistocene [illegible]?).

BIOSYSTEMATICS AND THE ORIGIN OF ACORUS.

The title of our paper is biosystematics and the origin of Acorus. I do not think it will give you much information on the biosystematics of the genus, and its real origin is still hidden in the dark, although you will be able to deduct your own opinions as to the origin and age of the American and European taxa. And perhaps most of all, you will see how even the greatest authorities in our science make serious mistakes. Not only so that six taxa have been given thirty different names by some or are included in one species only by others. But also so that it may sometimes look as if the great men know all about the dispersal and history of a taxon, when they in reality know less than nothing. But let us come to the story itself.

There is no record of when man commenced to use the rootstocks of the Sweetflag for medical purposes, but they - or their aromatic oils - have been used by the peoples of three continents from time immemorial. It is not esteemed as much by the white man as by the yellow man at present, but there was a time when it belonged to the most expensive of drugs which were transported over land all the way from India to Britain. Then everybody knew that the rootstocks were active against a variety of diseases. Chewing them was certain against toothache, and the juice when swallowed was a useful cure for disorders of the stomach, like flatulency and wind cholics in infants and sailors. Dizziness could not stand this extract, and it was said to be just the remedy against indigestion and even the dreadful cholera. Some people felt that the constant use of the extract prevented all these and even more disorders, so that they used it daily as a kind of tea or candied the roots and chewed them like Americans chew their gumx. The extract is noxious to insects, and although in water it is pleasantly warm and bitter, the alcoholic extract has a very nauseous flavour. Despite of this, some of the finest of liqeurs, like benedictine and chartreuse, get part of their flavour from the roots of Acorus. If the use of the drug in the beverages has anything to do with the believe that the aromatic oil should be a strong aphrodisiaca we do not know.

Because of all these properties of the Acorus rootstocks they have been used by the people of India, Persia, and Arabia for a very long time, and although other explanations seem to be prevalent, we are inclined to believe that it is just the so-called calmus of the Bible. It had been imported in dry condition to Europe for centuries when the first living plant came from the Turkish court of Constantinople to the Botanical Gardens of the Empress Elisabeth in Prag and Vienna anno Domini 1562. The next year Matthioli in Prag and Clusius in Vienna had made very detailed descriptions and observations on the plant which they published together with splendid illustrations, and other scientists soon added to these studies. It is worth while here to point out that even these earliest authors discussed specially the complete sterility of the plant, since this is a feature of considerable taxonomical importance as we will see later.

Although Acorus spread to some Royal Gardens and Gardens of monasteries in the decades following its first introduction into Europe, it did not become a cultivated plant immediately, and it took a century before it had escaped and dispersed to many streams in western Europe. The rootstock and drug continued to be imported and it also continued to be expensive even after it started to come also from North America. There are available records of its import to Britain and France from New England and Canada about 1600, but since the American root was regarded as inferior to the oriental and European one, it did not affect the price of the latter substantially.

Many of the old American botanists were of the opinion that Acorus was indigenous in New England, as Rafinesque most clearly emphasized in his Medical Flora, and Gray said in the first edition of the Manual in 1859, but others regarded it an introduction. We have not been able to discover when and why this latter view became predominant nor have we been able to find the "facts which any real searcher for the truth could easily have determined by writing a few letters", as Merrill puts it in his last book in connection with his criticism of Sauer, that "the common sweetflag was introduced from Europe by our earliest colonists, arriving, very likely, in Jamestown in 1607 and in Plymouth in 1620; it may have been a Mayflower passenger, or it may have arrived, a few years earlier, at the French settlements in eastern Canada." But it was just this statement which put us on the trail of the American plant, and, later, on the tracks of the classification of the other taxa of the genus.

We mentioned the fact that American rootstocks were regarded as inferior to Oriental and European ones already three and a half centuries ago. This is again reflected in the modern pharmacopeias, which in Europe require at least 2.5% of the etheric oils from Rhizoma Calami, while the American National Formulary requires a minimum of only 1.2% of the oils. These differences between the European and American requirements immediately indicate profound differences between the plants, and chemical investigations have demonstrated that American and European specimens cultivated in the same garden yield 2.1% and 3.1% of the oil, respectively, as an average. But there are other differences, too.

The first European botanists studying the plant Linnaeus later named Acorus Calamus mentioned its complete sterility. During the almost four centuries passed since then an innumerable number of scientists have tried to get an idea of the cause of this sterility, but not before cytologists studied the plant the real reason could be revealed. The American plant, however, is always fertile and produces good seeds also in the northernmost localities. This difference is another indication ~~of~~ that the American plant has not been introduced from Europe but is an old and well established member of the American flora. The cause of the sterility of the European Acorus is its being a triploid, with 2n = 36 chromosomes which almost always form twelve trivalents at meiosis. This is also the fact with Indian material, but the American Acorus is always fully fertile because its being a diploid with 2n = 24 chromosomes which always form only ring-bivalents at meiosis.

Morphological differences between the American and other proveniences of Acorus are perhaps not very obvious but they are nevertheless distinct and significant. These differences are mainly in the thickness of the cone and in its relative position as compared to the scape as well as in the morphology of the leaf and the form of its tip. And when cultivated together with European ~~material~~ and Asiatic material the American plant, or its proveniences from the Montreal area and the prairies, flowers about three weeks later than all the others.

We are not going to show you herbarium material of the American and other *Acorus* at present, but hope you will believe our statement that they are all distinguishable in the herbarium when you know what characters you should look for. But all the differences we have mentioned have at least convinced us that the American plant has not been introduced from Europe and that it has not more to do with the Eurasiatic triploid than with other taxa of the same genus, rather less. Our opinion as to its being old and well established on this continent might seem to be fairly substantially supported by the fact that the very same plant was common already in the Wilcox flora in the southern States in late Paleocene, or 50 million years ago according to recent estimates. This we could easily determine without writing the letters suggested by Merrill, since it is mentioned among others by Berry in his good review of the Tertiary floras of eastern North America in the Botanical Review of 1937.

An accepted species must have a name, and since you certainly now have got the feeling that we regard the American *Acorus* a species distinct from the sterile and triploid *Acorus Calamus* of Eurasia, you might be waiting for hearing its correct name. Without giving any details until later, we must at this time also tell you that two other diploids and one tetraploid occur in Asia, where they are usually but incorrectly included in the Linnaean species, but none of these taxa are identical with our plant, and they are as remotely related to it as this is to the sterile triploid.

It is our experience from almost twenty years studies of collective species including polyplotypes that only rarely have these not been observed and named by classical taxonomists, although later and less sharpeyed colleagues have not always accepted their treatment. This is also the case of the American Acorus, although only Houttuyn and Rafinesque have really observed that our plant differs from foreign material. Houttuyn in 1777 named the eastern Noth American plant as the species Acorus verus, but since this name had already been used for Acorus Calamus, it must be dropped as a homonym. And Rafinesque named first the New England plant as a variety americanus of Acorus Calamus in 1828, but when he in 1836 gave it the rank of species equivalent to his also new species Acorus floridanus, he had already in 1832 named another American material as Acorus flexuosus, and still later, or in 1840, used the name Acorus angustatus for indigenous representatives of the genus. This was his artistic method of naming species, and it is perhaps deplorable since he created a few more names than we need and made it difficult to decide upon the synonymy. But we must nevertheless use his names if we do not want to ~~create~~ break the International Code and create new synonyms others will reject. And as a matter of fact as long as the methods of ~~art~~ scholastics prevail over the methods of science in the naming of species we should remember that Rafinesque was not alone in making mistakes.

We are not the first botanists unable to find material touched by Rafinesque, and we have not yet been successful in getting authentic and indigenous material of Acorus from Florida to Carolina, where his Acorus floridanus was said to grow, or from Texas to Tennessee, which he reported as the area of Acorus flexuosus. But his descriptions of the four American species of Acorus are so excellent that to those who have a detailed knowledge of the genus there can be no doubt that although Acorus flexuosus and Acorus floridanus must be identical, they are certainly distinct from the more northern and common *Acorus americanus*, which is synonymous to Rafinesque's *Acorus angustatus* and grows from Nova Scotia and Quebec to Alberta and Oregon, south to Arkansas, Nebraska, Indiana, eastern Texas and Virginia. Or, with other words, the plant we have studied and mentioned so many times as the diploid American plant should be named *Acorus americanus* (Raf.)Raf., while a rare species in the far south should be named *Acorus flexuosus* Raf. We will be disappointed if the latter is not also a diploid, but botanists working in these regions should keep their eyes open for an *Acorus* which flowers very early, has either broad and gladiate and long leaves or short and narrow graminiform leaves, a triangular scape with a concave side, and the whole plant only about a foot high. According to the description this species - which we still have not seen - differs more from *Acorus americanus* than do the two diploid Asiatic species from each other. And biosystematic experiments leave no doubt that the Asiatic diploids are very distinct species.

This was the last of what we can tell you about our studies of the American *Acorus*, but since we did not come to this conclusion before we had revised also foreign material of the genus we will now give a short resumé of what we know about the taxonomy and distribution of the other species. The sterile triploid *Acorus Calamus* was introduced to Europe from Constantinople in 1562, but it had then been cultivated in India for at least several centuries. Its boundary to the east is in central China where it has been introduced long ago from Indochina, but in southeastern Asia it is rare and mainly replaced by the very distinct *Acorus gramineus* SOL. growing from

Indochina to southern Japan, and Acorus cochinchinensis (Lourr.)Schott from southern Indochina. Both these species are diploid, but while A. gramineus has usually been regarded as distinct from A. Calamus by Asiatic botanists, the other species is usually forgotten and included in Acorus Calamus. Of course this is wrong, although closer to the right than you may feel at first glance, since A. Calamus is a panautotriploid of A. cochinensis. Because of their great differences in distribution it may be practical to separate the sterile triploid from the good and fertile species, although it is genetically only a hybrid, ~~although~~ but usually other triploids get no names at all. But if one of these names is to be dropped, it should be the Linnaean name which was undoubtedly based on the triploid alone. Linnaeus himself would not have hesitated to do so had he only known.

In central and northern Japan, central China north and west to ~~xxx~~ central southern Siberia grows still another fertile species of Acorus. This plant is morphologically very distinct, and when crossed to ~~them~~ the others no vital seeds are formed. The reason for this is the fact that the northern species is a tetraploid, or, more exactly, an allotetraploid, as far as can be judged from its meiotic divisions. It was last described as Acorus asiaticus from Manchuria by Nakai in 1936, and is rather well known as Acorus spurius, which was described from Japan by Schott in 1864. Its correct name, however, is Acorus triqueter. That name was given to it by Turczaninow in 1831 without description, but since Schott furnished it with the Latin description in 1860 this certainly is the valid name for the tetraploid species.

Before we leave Acorus this time it is tempting to say a word about the possible reason ~~for~~ why that the triploid, and not the diploid or tetraploid, became the most useful drug producer in India and Europe. There is no time for this, however, although it must be said that it certainly is directly caused by the fact that the content of the drug increases with an increase in chromosome number. This is one of the oldest and best examples of plant breeding by aid of polyploidy and the selective dispersal of the triploid is certainly no coincidence.

The story of the genus Acorus as a whole is as remarkable as other stories of dispersal with and without the aid of man, and its taxonomy and evolution may be of great significance for our understanding of some of the factors governing the dispersal of plants in the past. But from the practical point of view it is certainly worth while to emphasize that, the positive connection between polyploidy and drug content observed in Acorus, seems to be a general rule also in other medicinal plants studied so far. If this is really so, our Acorus might not only be a good plant for studies on evolution and taxonomy but still better as an indicator of the methods for breeding drug plants to help us to prevent and counteract the bodily disorders and nervous troubles of a hunted mankind.

Biosystematique de ~~l'Acorus~~ la genre l'Acorus. ~~en Amérique.~~

According to recent floras, the species Acorus Calamus L. ~~is not [illegible]~~ is typical not only of Europe but also of wide areas in North America. It is known that it was introduced into Europe from Turkey in 1562 (cf.), and according to Merrill (1954) it was likewise introduced into North America in 1607 and 1620 from Europe. Although the alien nature of the species on this continent seems to be accepted by

Fernald (1950) and Gleason (1952), Marie-Victorin (1935) regarded it as native, and so did also Gray (1859) and Rafinesque (1828, ...).

~~A more detailed study of the genus has revealed that its Eurasiatic,~~

It was pointed out already by the first European botanists (Matthioli, Clusius) studying the introduced plant that it is completely sterile, and several later students have been able to verify that observation for the European and Indian ~~[illegible]~~ material (cf. Wein . . .). The reason for this sterility is simple: the plant is ~~a~~ triploid, or panautotriploid, with 2n = 36 chromosomes and the almost complete ~~trip~~ trivalent-formation during its meiosis prevents it from forming fertile pollen or ovules (cf. Wulff. -- —). In eastern Asia, however, two fertile and diploid species are met with, i.e. A. gramineus (2n=24) ~~and A. cal~~ (cf. Wulff. etc.). and A. cochinchinensis (~~a~~ 2n = 24), ~~[illegible]~~ ~~and~~ the third fertile species is the A. trigueter Turcz.; Schott from northeastern Asia and Siberia, which has been found to be tetraploid with 2n = 48 chromosomes (Wulff. --). The Eurasiatic ~~triploid it~~ sterile plant is an autotriploid of A. cochinchinensis, which has survived and become widely distributed by man because of its higher drug content.

The American plants are always fertile so that this character alone supports the suggestion that they are to be regarded as truly indigenous.