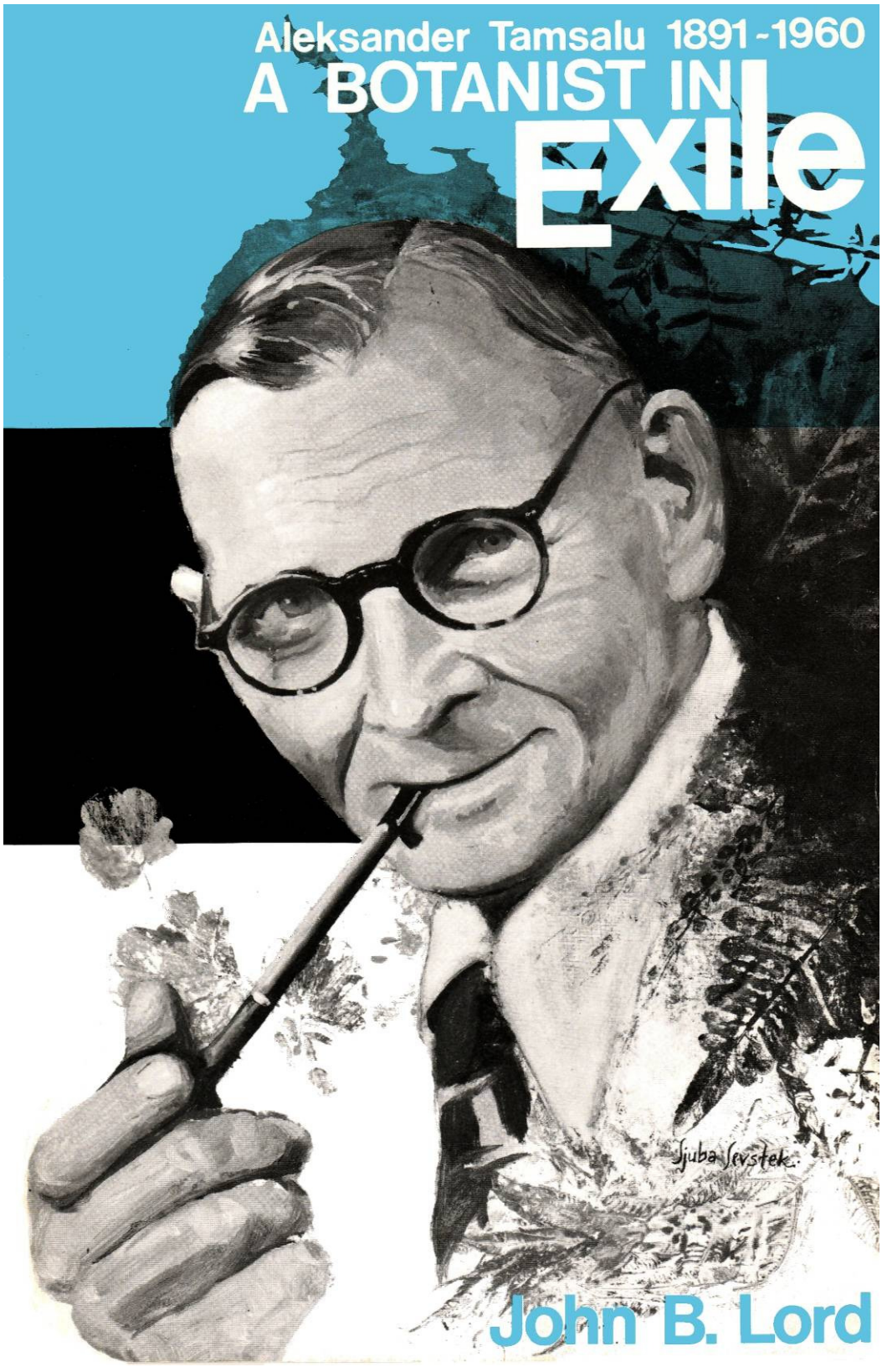
Aleksander Tamsalu 1891-1960
A BOTANIST IN
Exile
John B. Lord

About the 2011 electronic edition:

This edition was prepared and edited by Dr. David Galbraith, Head of Science, Royal Botanical Gardens, to coincide with Aleksander Tamsalu's 120th birthday, 28 April 2011. It is a sad coincidence that the completion of this edition also coincided with memorial services for RBG's Director Emeritus Dr. Leslie Laking, who died on 16 April 2011 (see pages 76 and on).

This edition was re-typeset from a copy of the original 1980 imprint through optical character recognition scanning and manual reformatting. Regrets are expressed for any errors that have been introduced into the 2011 edition through the editorial process.

Changes to this edition relative to the 1980 original:

1. The caption to the photograph of Tamsalu on page 93 has been corrected.
2. Text on page 93 referring to the International Code of Botanical Nomenclature and the 1959 Botanical Congress in Montreal has been corrected.
3. An additional letter has been added to the list of reference materials (132)
4. References to sources cited within the text have been moved to parentheses immediately following the paragraph to which they refer.
5. A new appendix (III) consisting of additional photographs has been added for the interest of readers, following page 127.

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To

DR. ELMAR JÄRVESOO

Professor Emeritus
University of Massachusetts

whose broad knowledge
and enthusiastic assistance
helped make this work possible

Aleksander Tamsalu during an autumn field work session.

INTRODUCTION

As a botanist and agronomist, Aleksander Tamsalu was best known in northern Europe and the Baltic region although he also attracted some local attention for his work in Canada and the United States. In his native Estonia, he is still recognized as one of the most prolific collectors of data on the plant communities of that republic. He spent more than 20 years as a teacher and consultant with various Estonian government agencies and was, under Dr. Theodor Lippmaa, the leading member of a botanical research team at the University of Tartu. After he fled Estonia as a political refugee during World War II, his path eventually led him to the Royal Botanical Gardens, Hamilton, Canada. In only five years (1955-59) as an ecologist at RBG, he prepared for this institution a comprehensive herbarium of over 9,800 plant specimens and made by far the most detailed survey of native plant communities ever attempted on RBG property. In his spare time, he also did considerable field work on the vegetation of southern Ontario.

Tamsalu's story is as frustrating as it is intriguing - mainly because of what he was unable to accomplish. A man of his experience, energy and special talents had the potential to contribute a significant chapter to the history of plant science. Many external forces militated to push him off course. But there was another influence. His personality was such that he often mismanaged or failed to recognize the opportunities that came his way. In that respect, he governed his own fate as much as did any other factor. Still, his work under Theodor Lippmaa and his accomplishments at RBG make Tamsalu worthy of note. Also, he led an active, fascinating life through some very perilous times. These were the reasons that motivated me to attempt to write his biography. When I first proposed this idea in 1975, the positive reaction from RBG staff and from Tamsalu's friends and associates was unanimous.

Although I had expected to complete the project in about two years, it proved a more challenging and time-consuming task than imagined. With no previous such work to refer to, I had to deal entirely with original documents and eye-witness accounts. I have not attempted to reference in the text every fact concerning Tamsalu's personal and professional life. All resource material is listed in Appendix II. Numbers have been assigned to those items specifically cited in the text pertaining only to major quotations, facts of scientific interest or facts of an unusual nature which the reader might wish to verify.

Specifically on the matter of quotations, a further point should be noted. Tamsalu's command of the English language was never particularly good. Thus there is a sharp disparity in grammatical quality between his quotations in English and those he made in Estonian, but which have been translated into English. I have corrected the grammar - and in some cases the semantics - of Tamsalu's English quotations so they conform in structure to his quotations in Estonian. These minor alterations make his statements easier to read without changing the meaning of what was said or written.

I am indebted to many individuals and institutions for their co-operation during the course of my research.

The late Dr. Elmar Leppik, U.S.D.A., Beltsville, Maryland, provided impetus through his initial enthusiasm and assistance.

Mrs. Aino Tera, Tamsalu's daughter, loaned nearly 200 documents and photographs and endured several hours of interviews making what were often disturbing and sensitive recollections. Mrs. Tera also checked the biographical details of the manuscript.

Since 1978, Dr. Elmar Järvesoo, Professor Emeritus of the University of Massachusetts, has been my principal contact on matters pertaining to Estonian history and science. His editing of the manuscript weeded out the more blatant historical inaccuracies - particularly in the first four chapters. Dr. Järvesoo invested a great deal of time searching biographical details about Tamsalu both through the mails and through personal visits in the U.S. and Finland. Through Dr. Järvesoo, information was provided by Mr. Jaak Ümarik, Dr. Joosep Nõu, and Professor Emeritus Hans Kauri.

Information and/or publications were also supplied by Dr. Liivia Laasimer, Dr. Henrik Aasamaa, Dr. Hugo Salasoo, the late Prof. F.H. Montgomery, Dr. James Soper, Dr. Elmar Jaska, Dr. Endel Aruja, Dr. Bernard Boivin, Dr. Leslie Laking, Mr. Ray Halward, Dr. Michael Stieber and the Hunt Institute, Mr. Eric Peterson, the Talcott Mountain Science Center for Student Involvement, Mr. John Lamoureux, the Library of Congress, and the libraries of the University of Toronto, the California Academy of Science, and the University of Moscow. I should also extend my gratitude to an anonymous librarian at the Library of Scientific Societies In Helsinki for an alacritous but unfruitful attempt to locate some requested journal articles.

My wife, Christine Lord, initiated several library searches for copies of published scientific papers. She must be applauded for her patience and encouragement during the months of evenings I spent writing the manuscript.

Miss Silvia Birk and Miss Aida Tammer translated Tamsalu's letters, published papers and manuscripts from the original Estonian, and Mr. Charles Holetich translated a letter from the Russian language. Without these valuable services, much essential information would have been inaccessible.

Miss Carol Kippers and Miss Joanne Hovey counted and catalogued the Tamsalu herbarium specimens at RBG.

Mr. Bill Crins of Erindale College provided a critique of Tamsalu's taxonomic observations.

Mrs. Nellie MacDougall typed the manuscript and typeset (composed) the final version. She also provided many helpful comments and criticisms. Maps, illustrations and cover design were executed by Miss Ljuba Levstek. The layout was done by Mr. John Oblender.

Finally, I wish to thank Dr. David Smith and Mr. Denis Stevens, of the University of Guelph. for their critical reading of Appendix I; Dr. Peter Rice for his editorial comments; and Mr. Henk Vandermaas and my father, Mr. James Lord, for the final proofreading.

John B. Lord

Burlington
September, 1980.

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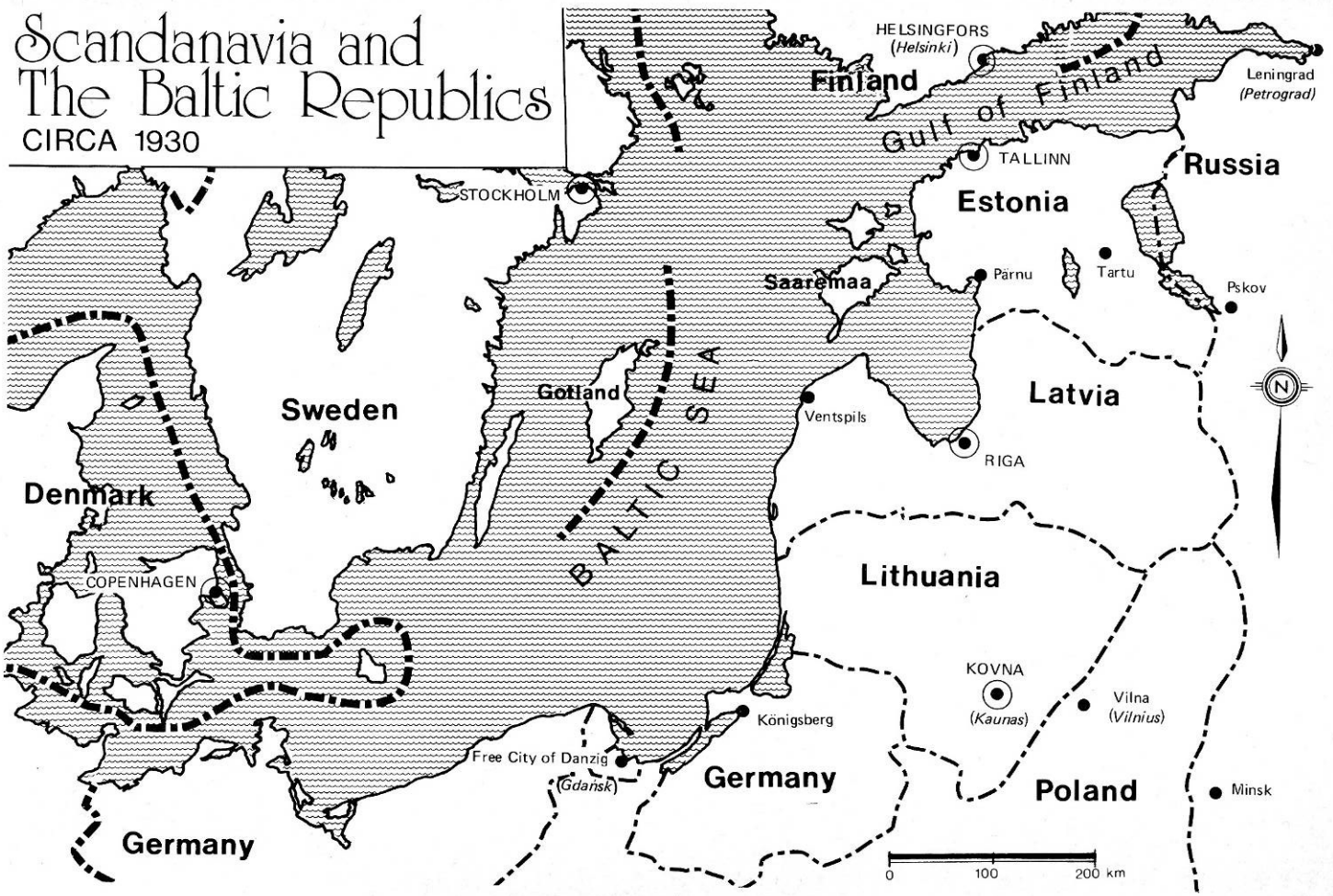
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I

A PRODUCT OF THE TIMES

At the village of Tammaru in Pärnumaa (Pärnu county), Estonia, Aleksander Tamsalu was born on April 28, 1891. His original surname was "Tomson", a remnant of very distant English ancestry. He did not assume the Estonian surname "Tamsalu" until many years later.

His early life was painted in sombre hues. His brother died in infancy, not an uncommon occurrence at the time. A younger sister, Marta, reached the age of 18 before succumbing to an unknown cause on an unknown date. Her death left him as the only surviving sibling.

His mother was such a petite and passive woman that Tamsalu neglected to leave even a written record of her name. She was completely eclipsed by her stern, austere husband, Jaan Tomson. Tamsalu assimilated the most prominent quality of his father's character, namely a relentless energy which was usually ignited by an exceeding stubborness to have things his own way. Though Tamsalu would later speak admiringly of his father's pride and strong will, there were times when their similar natures led them to serious confrontation, even over the most basic issues.

Tamsalu's childhood has been all but obscured by the passage of time. It is known that he was raised on a large river-front farm called "Karjasmaa", 17 kilometres east of the county capital, the port and summer resort of Pärnu. Since the economy of the Estonian state was geared largely toward agriculture and natural resources, it is not surprising that his youthful curiosity converged upon wildlife and both native and cultivated plants.

Even as a boy he possessed an exceptional memory for details. In a way, this may have contributed to his developing a collector's mentality, a preoccupation with order and completeness. Nature provided him a tranquil and well-ordered retreat from conflict, from chaos, perhaps even, at times, from responsibility. He was both introspective and footloose. The woods and meadows were places to wander and explore in mind and body and to do what he enjoyed more than anything: to think and philosophize; to study in the calming presence of his animal and plant "friends".

Public school education had been compulsory in Estonia since the 17th century, although after the early Tsarist period enforcement was lax. There is no way of knowing exactly when Tamsalu started to attend school, but he probably enrolled during the autumn of 1898 - a year earlier than most rural children.

Eleven years earlier, the Russian government, which had ruled Estonia for nearly 200 years at that time, had prohibited the use of the Estonian language in all schools, except for religious instruction. Since many of the monolingual Estonian teachers were replaced by Russians, it was necessary for the students to learn the Russian language before

effective teaching in other subjects could begin. This language problem shaded the quality of education in Estonia for many years. Within this frame of reference, Aleksander Tamsalu received his primary school instruction. For six years he attended a local school near the farm. In spite of his ability to memorize, learning new languages was always Tamsalu's most serious weakness and it may be surmised that he had some trouble with Russian. Although he did become completely bilingual (and eventually quadrilingual), his spoken Russian never fully equalled his reading and comprehension of the language.

Nevertheless, by the time he graduated from primary school, it was clear that Tamsalu was a gifted learner. Had he not been, his formal education would have ended then and there, and he would have had no choice but to remain at home and learn to manage the family farm through the conventional channel of experience. That would have pleased his father. Although during this period it had become fashionable among farmers to have their children educated, Tamsalu, the only male child, was the natural heir to the home-farm. The farm was his father's only concern since he had spent much of his life building it to its present state. But the young teenaged boy had no such interest. Perhaps he was motivated by a newly ingrained love for academic life. Whatever his reason, Tamsalu nagged incessantly to be allowed to continue in school. His father finally consented.

At this point, though Tamsalu may not have understood the full portent of the situation, his father directed him away from higher education and into the vocational sphere. With proper financing, Tamsalu could have attended preparatory "middle school" followed by *gymnasiu*m or "high school". Pursuing this course, he would have received his *Matura* or "maturity certificate", the prerequisite for university entrance. But, whereas primary education was provided free by the state, further schooling demanded tuition fees which Jaan Tomson simply refused to pay. Tomson could have afforded university tuition had he been so inclined. He was financially secure with a larger than average farm and the most modern farm equipment in his district. But he had reached that plateau solely through aggressiveness, shrewdness in business and years of back-breaking toil. He had had no high school education himself and viewed his own success as the ultimate proof that formal schooling was a waste of time. So, by his convictions, Tomson forced his son to share the fate of multitudes of talented Baltic youths who were barred from higher education through poverty.

Tamsalu could have chosen a military career or the priesthood but he opted instead to attend a vocational school through which he could train as a teacher.

Beginning in 1904, he studied for four years at the "city school" of Pärnu. Following that, he took a two-year pedagogical course for elementary school teachers, associated with the same institution.

When he received his teaching certificate in 1910, Tamsalu had earned dual credentials as a public school teacher and as priest's assistant (Köster) within the Greek-Orthodox Church. Whether his religious training was undertaken independently or as a part of his studies at the "city school" is unknown. In any event, the title of *Köster* gave him ecclesiastic authority to conduct such church rituals as weddings, baptisms and funerals, and to teach religious education as well as secular subjects in the primary school system.

For two years after graduation, Tamsalu taught at Laiksaare, a small region in the southern part of Pärnumaa. Teaching at lower grade levels would always be his special talent, a talent he would grudgingly return to at times when other ventures failed. But he soon discovered that elementary teaching could not provide the career challenge he desired. Worse, he had little opportunity to pursue his interest in plant science. Firm ideas about returning to school began to sublimate in his thinking.

While at Laiksaare, Tamsalu met a gentle, attractive woman named Julia Allikas, whom he would marry after a relatively brief courtship. Tamsalu took her to Karjasmaa to meet his parents during the summer of 1911. This was one of the few times his mother ever came to prominence, wielding a kitchen broom to keep the young prospectives a respectable distance apart.

Some of those outside his family who knew Tamsalu as a young man considered him rather eccentric, since he had evolved a Bohemian life-style at Laiksaare. He seemed reflective and bookish. He read and quoted classical literature and was keenly interested in music. Though he fancied himself a philosopher at large, he impressed people as a dreamer full of well-intentioned but impractical ideas. If his ideas were impractical it was not so much for any etherial quality, but rather because he was unable or unwilling to accept limitations. He was constantly looking for ways to apply his knowledge. Pure science was never his milieu.

In studying plant science, Tamsalu inevitably chose agriculture, specifically agronomy, as opposed to pure or theoretical botany. He would have preferred to attend the Agriculture Programme at Estonia's University of Tartu - an ancient centre of learning from which most important Estonian officials had graduated-or the Department of Agriculture at the Riga Polytechnic Institute. But circumstances did not allow this. Without a maturity certificate he could not enter any such institution, nor could he ever expect to advance himself beyond the level of a technician. Thus obtaining the maturity certificate became his highest priority.

Rather than attend the Estonian *gymnasia*, Tamsalu chose to matriculate through an agricultural high school, where tuition fees were presumably lower. The nearest such school was at Petersburg, Russia, and operated under the jurisdiction of the Petersburg Institute of Agriculture. This option permitted him to take not only secondary school sciences - chemistry, physics, botany, mathematics - but also courses in agronomy and farming practice. The latter probably overlapped with college-level subject matter. After matriculation he would continue to the college level at the Institute of Agriculture to work toward "a graduate diploma in agronomy". Thus conferred with the title of "learned agronomist", he would be qualified to contrive and conduct research, or to continue to more advanced degree studies.

Once again Jaan Tomson could have helped his son financially. But when Tamsalu finally asked him for a loan, one can only imagine the verbal exchange that took place. Tomson considered the whole scheme ridiculous, and angrily made it known that he would have no part in it. Tamsalu was now on his own, determined to see his plan realized without help. He gradually accumulated some funds and on May 6, 1912, he and Julia were married. The following year they moved into an apartment in Petersburg, at that time the capital and major cultural centre of the Russian Empire.

Predictably, Tamsalu found himself hard-pressed to maintain his studies at the school and support his wife at the same time. Each week he took 30 to 32 hours of classes and laboratory sessions, about half of them during the evenings. Julia also took some of the classes to keep abreast of what her husband was studying. The money Tamsalu had saved

Wedding of Aleksander Tamsalu (Tomson) and Julia Allikas. May 6, 1912.

did not last long, so notwithstanding this rather full schedule and the further consumption of valuable time in assignments, he had to work for his livelihood. He worked for sometime at common labour for various employers, but was eventually hired to a clerical position at the Central Railroad Office in the heart of the city.

During the early period at the high school, frugality governed every aspect of Tamsalu's life. He would routinely walk many kilometres to work to avoid paying a nominal streetcar fare. To add to the financial crush before he had completed his first year of studies, Julia bore their first child, a son whom they named Eugeni.

From the time he began to attend the high school until the last few weeks of his life, Tamsalu worked and studied with a certain urgency. When guided by a clear set of instructions he could be a methodical, meticulous collector and organizer of data. He could concentrate for long periods of time on the most picayune, hair-splitting details when others would quit in frustration. Without guidance, he had a disturbing tendency to diffuse his energy speculating and theorizing unfruitfully. This quality and his proclivity to take on an ever-increasing workload led to his oft repeated complaint that he never seemed able to finish the projects he started. The high school, and later college level of the Petersburg Institute, provided the kind of regimentation in which he functioned best.

One other quality which often did not work to his advantage was his outspokenness in matters of ethics and principles. He was sometimes in difficulty because he could not tolerate to see anyone successfully create what he viewed as a deception. The remainder of his life could have been much less complicated if he had merely tended his own affairs and kept out of such matters, especially those pertaining to politics. But, he could not. In the same year, 1913, he discovered a deception of sorts taking place, and became ensnared defending the victims. There were some farmers in the Petersburg region who were being subjected to a feudal-style farming arrangement which had long been prohibited. A clever landowner would lease a piece of land, usually of poor quality, to a farmer with a large family, requiring that the rent be paid by *corvée* - farm labour on the privately owned part of the estate. Thus the landowner could have all of his farm work done gratis. Tamsalu came to know some of these farmers and agreed to act as their representative in an appeal to the Russian Duma, the elective legislative council of the state. The appeal was made through Tamsalu's local delegate. Whether the appeal was successful is not known. What is important, however, is that the first contact with the Duma eventually led Tamsalu into league with a more influential Duma representative, Pave Milyukov. (100)

While Tamsalu was in his second year of study. World War I began. In August, 1914, Germany declared war on France and Russia. Almost immediately the Germanic name "Petersburg" was changed to the Russian form "Petrograd". War industries began to flourish in the city as the population swelled accordingly until, in 1916, it reached 2 ½ million. As the war progressed, Tamsalu continued his work and his studies.

He left no written record of his activities for the nearly four years ending in early 1917. However, it would be erroneous to presume that he withdrew into a self-imposed cloister to do nothing but study and live hand-to-mouth, for when he resurfaced in March, 1917, he was weighted with career responsibility. One can only wonder how he maintained his grades at the Institute for at the same time he had catapulted himself from a simple post as a railroad clerk into membership in the controlling body of the railroad: the Petrograd Railroad Committee. This was not all he had accomplished. Duma member Milyukov had selected a number of Petrograd students to act as liaison agents between the Duma and the civilian population. Tamsalu was one of them.

It is a loss to history that a Petrograder, who was as active in the events of 1917 as he was, did not carefully record his observations and impressions of those times. All that survives of his impressions are found in a few incidental remarks made in letters to a friend, Dr. Elmar Leppik; the few anecdotes he told to his daughter; and, mainly, one scathing seven-page letter written in 1958 to *Life Magazine*, in which he took issue with many details in a series of articles by historian Alan Moorehead on the Russian Revolution. These sources give a skeletal outline of what happened. (100, 72, 122, 120)

Tamsalu described himself as a "secret agent" and "section leader" under Milyukov. The former title accrued from the fact that he worked under a pseudonym. While he didn't explain the term "section leader", his anecdotes made clear that he was responsible for gathering and reporting current information to the Duma, probably from the central section of Petrograd. He and his student colleagues were also responsible for diverting possible crisis situations through contact with military and local civilian leaders. On March 12, 1917, (new style), when an unauthorized shooting of demonstrators took place on Nevski Prospekt, a main thoroughfare, it was Tamsalu who ran to the Tauride Palace to report to the Duma what had happened. (100)

The work under Milyukov seemed closely related to Tamsalu's duties as a railroader. Shortly after the abdication of the Tsar, three of his top generals made successive attempts to reach Petrograd to liberate him, not realizing he had left the city. The first attempt was made by General Krasnov's army. On the morning that Tsarskoje Selo was taken, Tamsalu went there to meet Krasnov's eschelon at the railroad station. The officers gave him a difficult time but he finally convinced them that the Tsar was not in Petrograd and that power was in the hands of the Duma. (100)

Armies under Generals Deniken and Kornilov were stopped and turned back through various acts of sabotage on the rail lines, orchestrated by the Railroad Committee. Tamsalu wrote: "With those actions, the railroaders prevented many bloody battles". (100)

Sometime after Kerenski took control of the provisional government in mid-July, Tamsalu was promoted to the post of Railroad Commissar for the Petrograd region. Needless to say, this position required full attention. This he was able to give since by now he had completed his four years of study at the agricultural high school and had obtained his maturity certificate. It is not certain how long Tamsalu remained in the position as Commissar, but it was at least until sometime after the Bolsheviks seized power.

From the onset, Tamsalu was distrustful of the Communists, but this distrust very quickly gelled to a deep-seated hatred. Proud of the progress he had made without financial help, he had no rapport with the Communist system of government confiscation and redistribution of private wealth. Another factor which may have shaded his opinion was the hard line taken by the Communists against the Orthodox Church of which the Tsar was ceremonial head, and Tamsalu, a minor official. But more pertinent perhaps was the fact that he equated this ideology with insurrection and civil disorder which was not only intolerable in absolute terms, but also threatened his objectives.

As Railroad Commissar, Tamsalu found himself in constant danger, especially through the "November days" of 1917, because from such a conspicuous position of authority he was well known to the Bolsheviks for his opposition to their activities. Although the date and complete details of the incident are now lost, it was after the Bolshevik takeover that Cheka* agents arrested Tamsalu. He was at least led to believe that a death

* "Cheka" was the "Extraordinary Commission for Combatting Sabotage and Counter Revolution", the predecessor of the K.G.B. or Soviet Secret Police.

sentence was certain for his allegiance to the Old Order. He was brought before Lenin for interrogation but this event turned out to be little more than a discussion, in fact a quite cordial discussion, of personal philosophies. According to Tamsalu's account, Lenin even tried to convince him to join the Communist cause. Finally, Tamsalu was released unharmed. Although his sympathies were reactionary, his railroad employment experience paradoxically extended to him the protection of one of the strongest unions in the country. And Lenin must have deduced that Tamsalu's main concerns were centred less upon politics than upon the efficient operation of a vital economic tool. Tamsalu never underrated his importance to the smooth operation of the rail system: " .. The Cheka could not conquer me. At one time when Red agents nabbed me, all movement stopped on all the railroads of Petrograd, and not a single car moved until I had been freed". (72, 122, 120)

And so Tamsalu defied the Revolution and, although it was not entirely his own choice, he remained in Russia another three and one half years coping under Communist rule.

* * *

There had been rumblings in Estonia about automony for the Estonian State. From August, 1917, the idea of Estonian independence as a totally separate nation was expressed and began to gain popular support. In January, 1918, three prominent statesmen were selected by members of the Estonian National Council to lead the activities of proclaiming independence.

Early February heralded two important events. First, the Bolsheviks marched out of the Brest-Litovsk peace negotiations. Trotsky declared that Soviet Russia was ending the war with Germany without signing a peace treaty that the Bolsheviks considered humiliating. In response, Germany decided to occupy the Baltic States. Estonian independence was proclaimed in Tallinn on February 24, 1918, but the next day German troops entered that city recognizing neither the Independence Manifesto nor the Estonian provisional government which had been set up. The Brest-Litovsk Treaty was in fact signed about a week later by which Russia relinquished control over the Baltic States "for all time". But until November, 1918, Estonia remained under German control.

Tamsalu was accepted into the Petrograd Institute of Agriculture in the autumn of 1918 to continue training as an agronomist. He was under considerable stress at the time. The inner life of Petrograd had been seriously disrupted by the removal of the Soviet Government to Moscow, and, throughout the year, tension emanated from the disturbances in the bordering territories. But there were other more personal stresses. Julia was now expecting a second child around the beginning of the new year. Meanwhile Aleksander, acutely conscious of the sixteen years he had already spent on formal education, insisted on recovering the year he had lost after high school by attending extra classes.

Even more emotional pressure was brought to bear by the political events of November, 1918. This was the month Germany lost World War I and began to withdraw the occupation forces from Estonia. On November 11th, the Estonian provisional government met in Tallinn and reaffirmed Estonian independence. Two days later came Russia's perfidious declaration that since Germany had lost the war, the Brest-Litovsk Treaty was no longer valid. Before the end of the month, Russian forces had attacked the border city of Narva and invaded Estonia. The Estonian government ordered general mobilization and received support in weaponry and volunteer manpower from both the Finns and the British. In spite of the fact that by the end of December the Russians had driven to within 27 km of Tallinn, the Estonians began to force them back. By February 24,

1919, the first anniversary of the Independence Manifesto, it was announced to a rejoicing nation that the invading Russians had been repelled across the eastern border.

But the fracas continued for ten more months. Amid the turmoil surrounding them in Petrograd, a second son, George, was born to the Tamsalu family on December 31, 1918.

During the "War of Liberation", Tamsalu was in the very awkward position of residing with the enemy. There was little he could do, since now the Soviets would not let him out of the country. Regardless of this, he seems to have taken much vicarious pride in following the events as his homeland broke from Russian rule. As he watched the Red Army's performance as fighters, the conclusions he drew forever tainted his impression of the Russian mentality. He wrote:

> *"(Russians) are brave, crude, even barbaric as long as they feel superiority. But hit them once, hard, and they run into a corner trembling like rabbits. We defeated them while outnumbered one against twenty in 1918-19. Westerners do not understand this Russian mentality and waste time and many valuable opportunities to end their foul play. Words, words, words do not mean anything to them. They understand only power."* (98)

Living conditions in Petrograd continued to deteriorate. Food became more and more scarce and the incidence of disease escalated sharply. At the Institute, an *ad hoc* committee was formed to protect the welfare of the student body by ensuring an uninterrupted food supply. This was no simple chore. It required constant searching, negotiation, and the planning of complicated logistics, often very far afield, as Petrograd and its environs plunged toward total ruin. As if he hadn't enough to do, Tamsalu was appointed chairman of the Food Committee. With his connections in the transportation industry, he was really the only sensible choice. His role transcended the normal duties of management. Alone, or at times with another Committee member, Tamsalu made a number of journeys south into Byelorussia seeking food sources. Again it is puzzling how he could assume an extracurricular position of such responsibility while keeping pace with his academic work. One significant factor may have been that during those difficult times course requirements were relaxed.

Tragedy struck the small family in September, 1919. With disease rampant in the city, five-year old son, Eugeni, contracted smallpox and the baby, George, caught the infection from him. The Tamsalu apartment was placed under quarantine and a nurse was assigned to look after the children. George nearly died. At one critical point he actually stopped breathing and it was only Aleksander's quick decision to perform artificial respiration that saved the baby's life. Eugeni was not so fortunate. His illness developed complications. One day, according to Tamsalu's account, the nurse had carried the child to an open window to watch a parade on the street below. Eugeni caught a chill which was followed by the onset of diphtheria. He died a short time later. Tamsalu always bitterly maintained, perhaps unfairly, that the death of his eldest son had been caused by the carelessness of the Russian nurse.

After the Russian - Estonian peace treaty was signed at Tartu on February 2, 1920, normal exchange of personal correspondence resumed between the two countries. For the Tomson family at Karjasmaa this proved a mixed blessing, for an official message was delivered to the Tomsons that their son, Aleksander, had been killed during the Bolshevik Revolution. Officials had confused Tamsalu with a namesake. The mistake was quickly rectified but not before Jaan Tomson had been jolted into a new frame of mind. Now upon hearing of the difficulties in Petrograd, he relented in his former unco-operativeness and tried to send his son a large quantity of money. Tamsalu would not use it. But rather than aggravate his contrite father, he simply put the money away. When he eventually returned to Estonia, he brought back the entire sum with him.

Despite all of these tribulations which beset him, Tamsalu was able to compress three years' worth of course credits into two years of study with such honours that in September, 1920, the Department of Botany invited him to be groomed for a staff position.

Pending his graduation, his appointment was to be effective in the autumn of 1921. It would make him, at the age of thirty, the youngest lecturer on the 120-member faculty of the Institute. The idea of remaining in Russia was never a serious consideration for Tamsalu after the Soviets took control. But he wanted to complete his education so he accepted the challenge as offered. For one year Tamsalu took part in practical research studies at an experiment station operated by the Institute where he completed his thesis work on potato culture, specifically on the effects of planting density on yield. His choice of specialization was not at all surprising. Potatoes, used in the spirit industry as well as for export, were one of the major crops throughout the northern part of the Estonian state. Furthermore, with a ready market at Pärnu they were probably an important crop on his father's farm. (1)

Julia, George and Aleksander Tamsalu (Tomson) at Petrograd during spring of 1921.

During his last few months at the Institute, he was privileged to study under geneticist and plant breeder Nikolai Vavilov. Vavilov's boundless energy and his relentless output of technical writing made a permanent impression on his student. (102)

One final aspect of the experiences in Petrograd should be noted. Tamsalu was surely one of the few elite who was able to turn the grave conditions of that city, during his last two years of residence, to a material advantage. When famine and disease struck in tandem the population became desperate. Whole families brought wagonloads of personal possessions, valuables and treasured heirlooms to the Petrograd market places to be sold. Some of the unfortunate needed money to buy from the dwindling food stocks; others merely wanted to get rid of their surplus possessions so they could join the masses who were streaming out of the city daily for conditions they imagined to be better elsewhere.

Conversely, the Tamsalus were in a stable position. They were not wealthy by any means, but they had food, shelter, a steady income and modest savings. Remaining as long as he had in a cultural mecca like Petrograd, Tamsalu had refined his tastes for classical literature, art, music, and tobacco products. For years he had restricted himself to few luxuries. Now, with bargains everywhere, he frequented the markets and bought freely whatever he wanted. For the equivalent of a few dollars he negotiated for a collection of sterling silver dinnerware; a complete set of fine china, hand-painted with a motif of the Tsar's crown; and a harmonium or reed-organ which was to become a highly prized possession, and which he learned to play skillfully. He also purchased numerous lesser antiques and articles of bric-a-brac, as well as jewellery for his wife. In short, within a few months he converted his meagre savings into an impressive collection of valuables and aesthetic goods.

* * *

When he graduated from the Institute in 1921, Tamsalu had successfully written examinations in 42 subjects. The completed courses were in diverse applied fields: cultivation of moors and meadows, silviculture, dairy management, vegetable cultivation, structure of farm buildings, agricultural machinery and bookkeeping. It was clearly an education to be used. For this he was awarded a "graduate diploma in agronomy", credentials later equated with the Master of Science degree by education officials at the University of Tartu. The title of "learned agronomist" was not conferred since all bourgeois academic titles were abolished during the first years of Soviet government. (127)

Tamsalu needed only to wait until September to accept the post for which he had trained. But this was not his goal. In July, he shocked his colleagues by announcing that he would decline the position and return to his native land. The administration at the Institute openly tried to dissuade him, yet privately there was some strange intrigue. When it became clear that Tamsalu was really going to leave the country, one official tried vigorously to entice Tamsalu to abandon Julia and marry his daughter instead. The proposal was not so amusing to the official as it obviously was to Tamsalu, for it has been suggested that the official may have been looking for a way to get his daughter out of Soviet Russia. Whatever the circumstances, Tamsalu refused all offers with little deliberation. (118,120)

Although he would often reflect that with his Russian education he would have fared better professionally in that country, he too was infected with Estonian nationalism, and furthermore he would not live under the Soviet regime.

His decision to leave the Institute, and the country, caused some displeasure within the administration in light of the time and training that had been invested in their

"youngest professor". However, as later events unfolded, Tamsalu's decision began to took more and more providential. The Communists had seemed little concerned with the routine of the Institute during the time when he was there. But in 1923, two years after he abandoned a seemingly secure career, there was a "cleaning out" at his former school and according to Johan Eichfeld, a survivor of the purge, 70 of the 120 instructors disappeared along with other scientists from Petrograd and elsewhere. Most were allegedly exiled to the island of Solovetsk in the White Sea, where they were never heard from again. With his record of "conscientious objection" and his position in the Orthodox Church, it is improbable that Tamsalu could have escaped sharing the destiny of those former colleagues if he had been within the grasp of the "Red Stork". (72)

Tamsalu was never actually presented with a diploma. Instead, he was given a transcript of his courses which was to be exchanged for a diploma as soon as a new format had been worked out. His maturity certificate had served its purpose and frankly he forgot to retrieve it from the files at the Institute. Ten years would pass before he would realize the importance of that oversight. (127)

No one knows how Tamsalu was able to spirit his newly acquired valuables out of Soviet Russia. According to the 1920 peace agreement, Estonians returning from Russia were legally entitled to bring their possessions with them. But since much of what he carried consisted of Russian *objets d'art*, Soviet officials might have created problems for him had they known about his cargo. Perhaps one should not underestimate the asset of his having friends and former subordinates in the Central Railroad Office. Regardless of how he managed the transfer, Tamsalu was thirty years old when he, his wife, and their surviving son, George, returned to Estonia where he would seek his first professional post with the Ministry of Agriculture.


The Republic of Estonia ·1920 ~ 1940·
Gulf of Finland
Kunda
Aruküla Experimental Station
TALLINN
Rakvere
Jõhvi
NARVA
Sinimäed
Paldiski
HARJUMAA
Tapa
Narva R.
Vormsi
Kuusiku Experimental Station
HIIUMAA
Haapsalu
Paide
Türi
Mustvee
PEIPSI LAKE
Vändra Tractor Station
Vändra
Põltsamaa
Põltsamaa R.
Kallaste
Muhu
PÄRNUMAA
VILJANDI-MAA
Leisi
SAAREMAA
Suure - Jaani
Vahi Agricultural School
Pärnu R.
Ema R.
PÄRNU
Tammaru
Viljandi
TARTU
Kõljala Agricultural School
Karjasmaa (Tamsalu Farm)
Kopu
VÕRTS-JÄRV LAKE
Russia
KURESSAARE
Mustla
Kanaküla
Mõisaküla
Laiksaare
Sõrve
Tõrva
Latvia
Antsla
Võru
Petseri
PETSERI MAA (Setumaa)
N
● - TOWNS AND CITIES
○ - OTHER LOCATIONS MENTIONED IN TEXT
0 km.
50
100

II

A SOLITARY STRUGGLE

Tamsalu returned to Karjasmaa, the family farm. In his estranged homeland there was really no other place to go. His father, who was 61 years old, was no more successful now than he had ever been at trying to persuade him to assume the duties of farm management. While Tamsalu went out searching for work, Julia, who was again pregnant, remained at Karjasmaa sharing the duties of raising the infant George with an eager grandmother. Another son, Vello, was born on the farm on October 6, 1921.

The Estonian Republic to which Tamsalu had returned was in many ways unlike the Homeland he had left eight years earlier. The country was forced to make some massive social and economic changes - changes which were to give Tamsalu and other people with agricultural training almost unlimited opportunities for employment. Two hundred years of Russian rule had forced Estonia to share Russia's economic life and comparatively underdeveloped conditions. With the coming of the Russian Revolution and independence, the monetary system collapsed, the mechanisms of production were thrown into disarray and the system of agriculture needed total reform. Rebuilding began with "bare hands". Natural resources, including land, were the key.

In 1918, during the early days of independence, 58 percent of the land in Estonia was owned by no more than 800 families of mainly Baltic German nobility. Their properties were in the form of 1149 huge manors or landed estates with an average area of over 2,100 hectares. Some families owned as many as six estates. The land owners were so powerful that they actually constituted their own local governments. About one third of the land of these private estates was divided into parcels leased to over 23,000 tenant-farmers. The remainder of the country was owned by some 52,000 farming peasants. (118)

Jaan Tomson was a tenant-farmer. And it should be noted that Karjasmaa, with a total area of 50 hectares, was about 50 percent larger than the average Estonian farm. Therefore, it was more profitable. Beyond that, Jaan, then later Aleksander, acquired for the farm many modern conveniences and facilities that other farms in the district did not have. Even in the early 1940s it was the only farm in the area to have a telephone.

In October, 1919, a Land Reform Law was passed in Estonia by which almost the total area of the landed estates was nationalized with compensation. Two hundred of the estates had been abandoned in ruins during the Russian invasion. The government assumed control of such properties to prevent their further deterioration. Some such estates were subdivided and turned over to settlers to keep the land in production. As a tenant of one of the former estates, Tamsalu's father, like other tenant-farmers, was later given the opportunity to purchase from the government the land he had managed for so long. True to his nature, he seized on the offer and became the first farmer on that manor to purchase his own real estate under the new plan.

This Land Reform Law created an entire new social class of independent, small landowners who, like the Tomson-Tamsalu's, were fiercely loyal to the new government and quite prepared to defend it. Indeed, the whole Republic bristled with the mechanisms of defence. The armed forces flourished. As an only son, Tamsalu was exempt from military service, but shortly after returning to Estonia he voluntarily joined a paramilitary army called the *Kaitseliit* or "Defence League". Organized for private subscribers, the *Kaitseliit's* sole purpose was national defense through anti-communist activity. Over several years, Tamsalu became such a prolific author and distributor of propaganda, that he was eventually placed in charge of all such activity for Pärnumaa. (122)

Comprehensive reform also demanded the establishment of a new system of education and training to upgrade the quality of farming in the fledgling nation. Agricultural research was to be a prime factor in reform. It was assumed that research specific to Estonia's needs would improve methods and bring the sharp increase in farming profits that was so needed to keep the nation financially solvent.

To begin progress, the government set apart certain manors intact, converting them into agricultural schools and experiment stations. Existing buildings were remodelled as offices, classrooms, labs and residences. Since Estonian soils were derived from two different types of bedrock (limestone in the north and sandstone in the south), it was necessary to establish a main experiment station in each of these regions. The obvious venue in the south was the University of Tartu where the new facility would also be used for experiments not directly related to the region. The northern counterpart was established at the Aruküla manor estate in Harjumaa (county), not only because of the medium depth of the soils there, but also because of the close proximity to major transportation corridors. The capital and port city of Tallinn was only 21 km to the west.

Work began at Aruküla during the spring of 1920. Jaak Ümarik, a graduate in agriculture from the Kiev Polytechnic Institute in the Ukraine, was appointed director. This was not a promotion for Ümarik. He was already head of the Bureau of Vocational Education and Research in the Agriculture Department*. The directorship of Aruküla was an extra duty thrust upon him because there was no other competent person available at the time. Ümarik began to set up experiments on the potential for growing sugar beets in the north. He also initiated work on the use of the two native fertilizers: phosphorous and glauconite (a source of potash). The results obtained from these experiments were published between 1920 and 1922 in the farming magazine *Agronoomia*. (2)

After these works were well underway, plans were made to expand the Aruküla station and its range of assignments. Ümarik could not handle the increased workload by himself. His duties at the Ministry offices were forcing him to spend most of his time in Tallinn. It became clear by late 1921 that Ümarik needed a vicegerent who could oversee the operation at Aruküla during his absence.

Aleksander Tamsalu, by good fortune, came looking for work at exactly that time. Ümarik was at the Ministry in Tallinn the day Tamsalu appeared for an interview with Rudolf Allmann, Director of the Agriculture Department. Ümarik and Tamsalu knew each other professionally from ten years earlier, when Tamsalu had taught public school at Laiksaare. Ümarik could not suppress a persistent uneasiness about Tamsalu's unorthodox air and proclivity toward the impractical. But, on the other hand, Tamsalu was unquestionably a good organizer, and his diploma work on potato culture had given him

*The Ministry of Agriculture comprised four major departments, one of which was the Agriculture Department. The Bureau of Vocational Education and Research was one of two bureaus within the Agriculture Department.

exactly the background he needed to manage certain experiments already in progress at Aruküla. Allman appointed Tamsalu Assistant Director of the Aruküla Station.

According to Ümarik, Tamsalu could have been appointed Director "if he had had the required education". If graduation documents had been the only shortfall, Tamsalu should have been able to obtain them through the Estonian Embassy in Petrograd. Traffic between Estonia and the Soviet Union was heavy during the early 1920s and Tamsalu did have a transcript of his courses. However, the problem lay not so much in documentation as in accreditation, a factor that would cause much more trouble for Tamsalu a decade later. (118)

Tamsalu moved to Aruküla and before the onset of winter his wife and two children transferred there as well. Routine became quickly established. Ümarik was now free to spend most of his time in Tallinn. He would return to Aruküla perhaps once every two weeks to monitor progress and leave general instructions with Tamsalu about what was to be done next. Tamsalu was the actual co-ordinator of experiments.

Julia (with Vello) and Aleksander (with George). Photo probably taken at Aruküla Experiment Station. Autumn, 1922.

Experiments were done on 2,500 sample plots spread over the 600 hectare heartland of Aruküla manor. There was a handful of trainees and assistants plus a dozen permanent skilled workers, but most of the physical work was done by students. The work developed in two spheres. One aspect was carried out in the fields and involved grain, tuber and root crops. Yield differences were investigated for different types of cultivars under various experimental methods of cultivation and fertilization. Tamsalu was delighted to be able to continue the work on potato yields he had started in Russia as a student. However his attention soon shifted. The other experimental investigations were concerned with the influence of different regimes of top treatment on hay crops in a reclaimed bog on a corner of the property. This latter project captured his imagination, developing into a life-long interest in grasses, grasslands and their management. Another of Tamsalu's responsibilities was to set up a weather station at Aruküla from which he kept records throughout his employment there.

Even when Aruküla was operating at peak capacity, problems, some of them economic, began to arise. They reached such a magnitude that it became clear the station would have to be moved to a new site. The site eventually selected was the Kuusiku manor, also in Harjumaa. It was announced that Aruküla would cease activities on the last day of 1924 and the entire staff would transfer to the new facility at Kuusiku to begin work anew the following day. Everyone except Ümarik and Tamsalu. Ümarik had been selected to study under the auspices of the Rockefeller Foundation and was destined to spend most of 1925 in the United States. Tamsalu was simply not needed at Kuusiku. In the fall of 1924, a talented, Learned Agronomist named Karl Liideman-Liidak had been awarded directorship of the new station, effective on the date of transfer. Liideman had graduated from the Moscow Agricultural Institute, had published two books, was a frequent contributor to various agricultural periodicals, and had spent about five years as a research assistant at the Hunger Steppe Experiment Station in Kazakhstan. His background was superior to Tamsalu's in every respect. Tamsalu's later belief that he was passed over for promotion because of his Russian education must have given him comfort, but it was a transparent delusion. Someone else was made Assistant Director at Kuusiku and Tamsalu was notified that he would be released when the business of Aruküla was concluded.

The decision was a bitter pill for Tamsalu, but in retrospect it was not unpredictable. During his years at the station, he clearly came to regard himself as director *de facto*, and he resented Ümarik continuing to hold the reins of command from afar. Given such a situation and Tamsalu's typically headstrong attitude, confrontation with Ümarik over policy and methods was inevitable, leaving the subordinate staff members in a quandary as to whose orders to follow.

Ümarik's complaint that Tamsalu could not work effectively with the staff contained the cryptic implication that Tamsalu did not work well with Ümarik. If there was one thing Karl Liideman did not need at Kuusiku, it was the help of an obstinate assistant who had just been spurned in his ambitions for directorship. (123)

Nevertheless, the output of data under Tamsalu's direction had been viewed as satisfactory by Ministry officials. Many experiments were completed. Many others, all of them long-term projects, were not. Tamsalu was asked to remain at Aruküla into the new year to close the station and sift as much information as possible from the experiment results. This he agreed to do. An article was written and eventually published in the 1927 Estonian Yearbook of Agriculture, in which was presented a summary of the Aruküla research. Co-authored with Ümarik, it was Tamsalu's first published paper of any major importance. (2)

During those last weeks at Aruküla, a series of events occurred that caused Tamsalu to leave his post in resentment and rancor. There are conflicting accounts of what happened but in comparing them a basic outline emerges.

Someone in the Ministry of Agriculture suggested to Tamsalu that he should apply for ownership of a portion of the Aruküla estate. No one in the Ministry had authority to give him any of the Aruküla holdings since privatization procedures were always referred to the land distribution committee of the local community. Yet Tamsalu was evidently led to believe that because of his term of service at Aruküla he could almost be assured of getting title to a piece of property. Exactly what section of the estate Tamsalu applied for is unclear. It could not have been that part where the major residence was located for arrangements had long since been made to cede that building to the jurisdiction of the local community school. Whatever property he aspired to, Tamsalu was elated with the prospect of such a windfall. But his elation was quickly smothered when an acquaintance of his, Karl Einbund-Eenpalu, applied for the same piece of property. Einbund was a man of influence. Not only was he Estonia's Minister of Internal Affairs, but he had also seen active service as an artillery officer during the War of Liberation. His military service gave him the highest priority as a potential recipient of nationalized land. Tamsalu had a relatively low priority since he had been in Petrograd during the war. The land distribution committee had little difficulty in selecting between the two candidates in favour of Einbund. (120, 122, 119, 118)

One can imagine the extent of Tamsalu's umbrage at losing a coveted piece of real estate only weeks after being notified of his impending dismissal. The logic of the decision did not soothe him. He was quick to hurl accusations, protesting that Einbund had used the threat of his high office to influence the committee. It appears Tamsalu was the only person dissatisfied with the outcome. His appeals were ignored. But for the rest of his life, Tamsalu could not abide Einbund, and would erupt at even the mention of his name.

During these proceedings, on March 11, 1925, another child was born to the Tamsalu family, this one a girl, Aino. She was their last.

Tamsalu was no longer satisfied at Aruküla. If he were looking for a reason to leave, he soon found one. Sometime after the birth of his daughter, he learned that his father had died at the age of 65. Tendering his resignation almost immediately, he moved his family back to Karjasmaa. For the record he cited his father's death as the only reason for leaving Aruküla. "I changed work to have free time for our farm", he wrote. This was less reason than excuse, but the unsavory details behind his departure remained within familial circles. (126)

In death, Jaan Tomson forced his son to do what he could not convince him to do in life: take over the management of the farm. Tamsalu had no choice. His mother could not handle such a burden alone. She survived his father by only one year. During that year, Tamsalu began to reorganize the farm along new lines.

Farming conditions in the Pärnu district were less than ideal. The heavy clay soil required generous applications of fertilizer to produce worthwhile yields. Drainage was a major difficulty aggravated by the flat topography and low evaporation rate. Tamsalu directed a great deal of energy into installing a network of wide canals - much larger than ordinary drainage ditches - which emptied into the river. This costly development made it possible to plant crops earlier in the spring. Many other improvements followed, mainly in increasing the area under cultivation until the entire farm was either in crops or in meadows for grazing cattle.

"Karjasmaa", the Tamsalu farm. (Pencil drawing from memory by Mrs. Aino Tera).

The planning did not end at Karjasmaa. In fact, he wanted to reorganize and improve the entire surrounding area through a scheme which was to include the digging of an elaborate and massive drainage channel system to service no fewer than 120 farms. He invested much time in drawing up an integrated master plan. But this, like so many of his grand designs, was overly ambitious and detached from the realities and limitations of the moment. His less visionary and less affluent neighbours were left shaking their heads in amused disbelief. The costs were prohibitive; the benefits, unconfirmed. The plans were rejected.

When Tamsalu's mother died in 1926, he became sole heir to Karjasmaa. By the time of the official transfer of ownership, he was satisfied that there was little more he could do by way of further alterations or planning. He began to search for more challenging and financially rewarding work elsewhere.

Teaching in the agricultural schools was his best option. Management and chief research positions at the experiment stations had mostly been filled by young graduates, and vacancies through turnovers rarely appeared. True, there were subordinate research jobs available, but college lecturers made much more money and had more free time for special interests. Tamsalu returned to Rudolf Allman at the Ministry of Agriculture in Tallinn and was offered a teaching post at the Kõljala Agricultural School in the island county of Saaremaa.

Saaremaa was the place that inspired a final change in the direction of Tamsalu's career. Always a keen observer of native plants he had, since 1922, devoted his spare time and much money toward examining wild plants - especially grasses and their communities - noting the presence of species he considered unusual. Saaremaa was anomalous. The largest of a complex of small west coast islands, it was of special botanical interest. Its dry sandy habitat and mild maritime climate were quite unlike the adjacent mainland, and the vegetation was strikingly different. Here, his attention to plant communities finally superseded all other interests.

His published papers indicate that Tamsalu was already making botanical observations in Saaremaa in 1926. It was mid-1927, however, before he moved permanently to the island and became settled into residence at Kõjala. There seems to have been no qualms about leaving the farm. Tamsalu disliked farm management now as much as ever. Julia was left in charge. She was capable of such work, and it is suggested that she was better able to deal with the farmhands and to follow up on her instructions than was her reluctant husband. Alone, she supervised the 1927 harvest. Then, about six months after Tamsalu had left, the farm was leased and Julia and the three children followed him to the agricultural school.

In connection with his lecturing on grassland management, Tamsalu had to acquaint himself with the natural pastures and meadows of this unusual island. Pursuing the studies he began in 1926, Tamsalu spent the summer of 1927 exploring Saaremaa, at his own expense, studying the grassland communities himself. To describe each plant community, ?e used a method he had learned in Russia in connection with evaluating crops. The prominence of each species in each plant community was estimated and recorded using a scale of symbols. In practical fact these estimates of prominence amounted to very rough measurements of the percentage of terrain covered by each species. (See Appendix I) The study was completed that same summer. Working independently, and out of touch with the appropriate journals, Tamsalu believed he was a pioneer in studying the plant communities of Estonia. A few years later, he would learn that he had actually been in elite company.

At this point, Tamsalu's knowledge of the history of Estonian vegetation studies was, to be charitable, inadequate. The only book he ever cited concerning Saaramaa's native vegetation was the diary of two Swedish botanists who had travelled around the island in 1891 and had noted the plants growing along the roadsides. This fact alone demonstrates how poorly informed Tamsalu really was. The western islands, especially Saaremaa and Hiiumaa, had attracted the attention of many local amateur botanists for many years. Since the reopening of Tartu University in 1802, researchers at the University and Botanical Garden had become involved. A comprehensive list of plants in Saaremaa had been published in 1823! Tamsalu also seemed completely unaware of the most contemporary studies on Estonian vegetation, including grasslands. There was a rapid accumulation of data during the post-war period when numerous books and papers were being published. (62, 118)

One must consider the reasons for Tamsalu's ignorance of the facts. He was trained in agronomy, not natural history or botany *per se*. As a botanist, he was an amateur. Besides that, his education in Petersburg had acquainted him mainly with Russian periodicals and research, not their Estonian counterparts. For that matter, most of the earlier Estonian publications were written in German, which Tamsalu could not read at the time. Finally, Tamsalu was simply not an avid reader of journals. Always a restless young man, he preferred to spend his free time in the field rather than the library. Since no one else at Kõljala seemed to share his passion for field work, he persevered completely on his own.

Before the end of 1927, he prepared a hand-coloured vegetation map of Saaremaa with an accompanying 110-page manuscript which he copied by mimeograph and distributed. He was puzzled by the frivolous way in which it was treated by the Kõljala staff. Tamsalu was motivated by the best intentions. He felt that the kind of vegetation inventory he had prepared was essential for any young nation developing a comprehensive land-use policy. This type of information was generally available from other sources, but Tamsalu's approach represented a new refinement which could have proven valuable had it been placed in the right hands. The right hands were evidently not among Tamsalu's contacts at Kõljala. The opinion arose among the staff that Tamsalu was off the mark and

wasting his time on redundancies. Tired and discouraged by this cool reception, he was tempted to think that further efforts would indeed be fruitless. Fortunately his stubbornness took hold of him. He chose to ignore his detractors and continued hammering at his private studies in faith that there was value in what he was doing. (3, 78)

Working as a lecturer, Tamsalu had a great deal of free time during his summers: six months each year to be exact. He took part in the professional updating and retraining sessions, which rotated from school to school, but spent most of his time in the field. One acquaintance does not recall ever seeing him at a botanical congress or symposium, so preoccupied was he with his avocation. (123)

Tamsalu should have prepared an abstract of his Saaremaa research for publication in Agronoomia. Most young researchers popularized their work through publishing in newspapers and farm journals. But Tamsalu, even as a professional researcher at Aruküla, made little or no use of this option. For him, the challenge of new projects and the freedom of open spaces usually lured him from the drudgery of rewriting manuscripts.

Having already planned a companion study to the Saaremaa work, he began researching and cataloguing the grasslands of Hiiumaa, the second largest Estonian island. He had tried most of the known methods for estimating vegetation community composition and to investigate Hiiumaa he settled on a Swedish technique developed by Hult-Sernander. It, too, was a subjective method but considerably more exacting (and time consuming) than the technique used on Saaremaa.

In 1929, he produced a second mimeographed manuscript and hand-coloured map entitled *The Grasslands of Hiiumaa*. The paper was hardly given a serious reading. It did little more than to convince his colleagues that Tamsalu was suffering a severe case of academic tunnel-vision. He became well-known for his assiduity but not for the intrinsic value of his work. Consequently a schism widened between him and the rest of the Kõljala staff. He was contemptuous of their views and found it increasingly difficult to relate to them. (4)

Left to right: Vello, Julia, Aino, Aleksander and George Tamsalu (Tomson) at Kõljala Agricultural School, Saaremaa. Circa 1930.

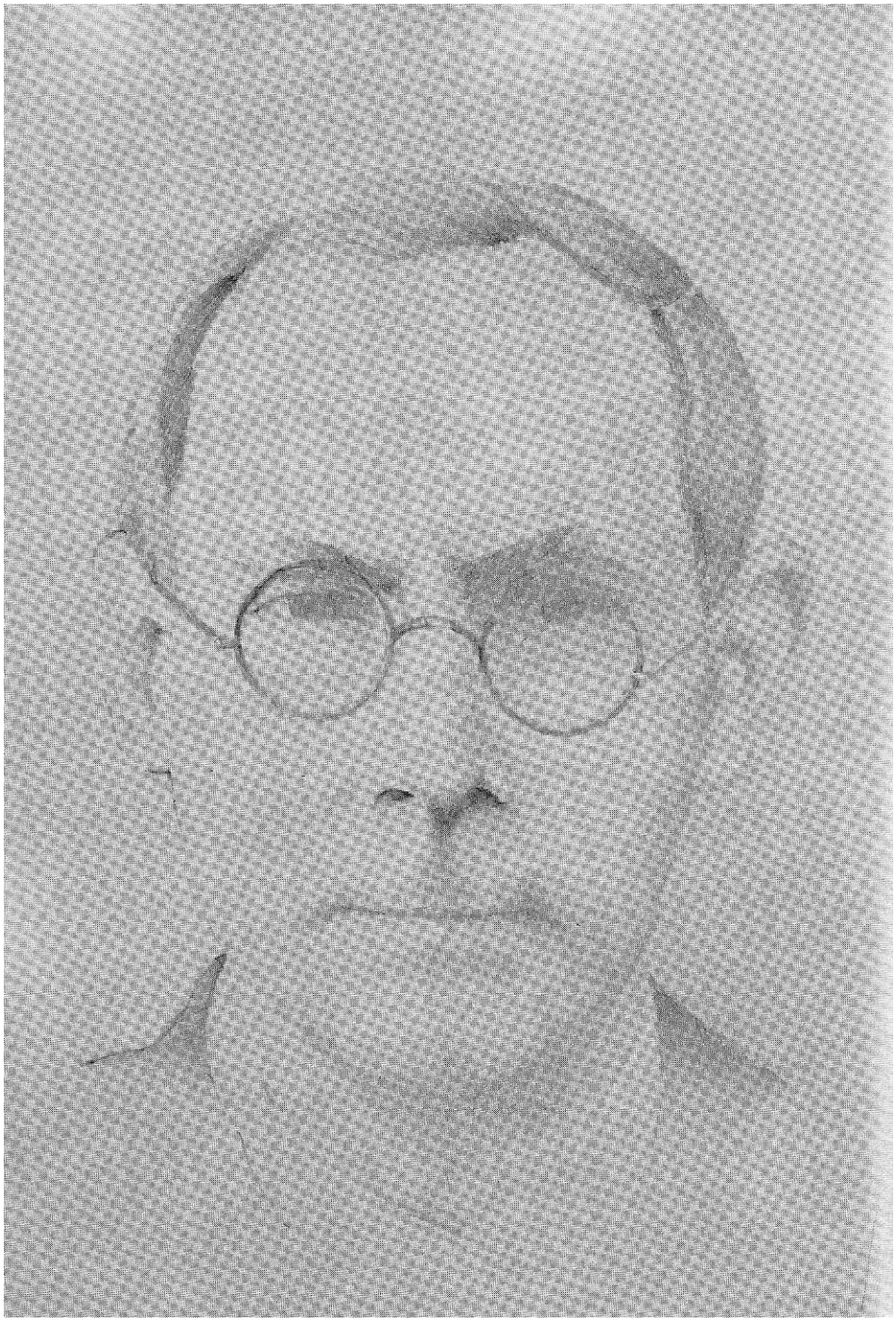
Staff of the Kõljala Agricultural School, Saaremaa, circa 1930. Aleksander Tamsalu, front row, second from right; Julia, third from right.

Such was life at the agricultural school as long as it lasted. To be sure, Tamsalu was a good lecturer who had a rapport with his students. And he knew his subjects well. But by 1931, his priorities and attitudes had so alienated everyone that the situation finally came to a climax. One of the other teachers at the school wrote an inflammatory article for the most widely circulated newspaper on the island. The article, loaded with epithets, accused Tamsalu of sowing discord among the Kõljala staff. Not one to accept such abuse placidly, Tamsalu found his detractor at the school the following day and the two men flew at each other in a raging and heated argument. That evening, Tamsalu came home to announce that he was no longer working at Kõljala.

Tamsalu maintained an interest in one project he had begun there. Earlier, he had noted that some coastal farmers were in the habit of periodically abandoning their seashore pastures to allow natural rejuvenation. In 1930, he organized an experimental area called the "Sandla Paddocks" in which he intended to demonstrate the influence of various methods of top treatment on pasture rejuvenation. The 40 hectare enclosure was actually a long abandoned coastal farm field which had become invaded by junipers, and had to be completely reclaimed. Working with local farmers, Tamsalu continued independently to monitor the Sandla Paddocks until 1933. But this was strictly a pastime, done for his own interest. All official connection with Kõljala was severed. (24)

For the immediate future, he could only hope to return to public school teaching. But in the middle of the winter school term there were no choice positions open. To maintain an income, he was forced to work in a tiny hamlet called Leisi, on the remote north shore of the island. Humiliated and emotionally shattered, he now saw himself no further ahead than he had been nineteen years earlier. Even worse, at the pivotal age of 40 his career in the plant sciences appeared to have come to an end, and he now believed he was doomed to continue his studies strictly as an amateur. Isolated at Leisi, Tamsalu fell out of view. In the hands of his former Kõljala students, copies of the "Saaremaa" and "Hiiumaa" manuscripts were scattered throughout Estonia. But no one of the Kõljala staff or in the Agriculture Department, and no one in the scientific community, paid him any further heed or bothered to review his writings.

Almost no one.



Theodore Lippmaa, circa 1938.

III

THE LIPPMAA RESEARCH

Phytosociology, the study of plant communities and their relationships, did not emerge as an independent science until the turn of this century. A scion of ecology and geo-botany, lacking both aims and definition, it experienced the adolescent period endemic to all new disciplines. Good evidence of this was the lack of solidarity among independent researchers in such fundamental areas as development of analysis methods and use of evolving terminology. After World War 1 there was a growing resource of phyto-sociological data which demanded organization.

The publication of Braun-Blanquet's *Pflanzensoziologie*, in 1928, was instrumental in delineating the aims and scope of the fledgling science. Strong central leadership was now needed to provide new vantage points over the whole question of plant communities. In Estonia, that void was filled by Dr. Theodor Lippmaa. (41)

Lippmaa rose from among the ranks of the northern European scientists when he became Professor of Botany at the University of Tartu. He was born in Riga, Latvia, of Estonian parents on November 17, 1892. His career had not begun with botany. Freshly graduated in chemistry from the University of Petersburg, Russia, he went as a high school teacher to the Altai region during World War 1.

Inspired by the rich and distinctive flora of the Altai mountains, Lippmaa began an intensive study of the region in his spare time. He generated an early reputation by discovering and describing a new species, *Cardamine altaica*, during his amateur investigations. (49)

Lippmaa entered the University of Tartu in 1922 to study botany. His initial interest In the biochemistry and ecological role of plant pigments was soon permeated by a curiosity about the new discipline of phytosociology. As a student and professor's assistant, he did his first botanical research in 1922 and 1923 in the county of Setumaa, in the southeast corner of Estonia, and published the results in 1923. At that time he was already planning to map the plant communities of Setumaa. (48)

Lippmaa presented his doctoral thesis in 1926, *On the Pigmentation Types of Pteridophyta and Anthophyta*, and was promoted to the post of "lecturer" the following year. In 1928, Lippmaa and his wife, Hilja, conducted extensive research in Pärnumaa, collecting a herbarium of 2,500 plant specimens and making ecological and geobotanic observations. After spending 1929 in France and North Africa, the Lippmaas returned to Pärnumaa to extend their research during 1930 and 1931. The resulting publication long remained the most complete local flora in Estonia. Full professorship at Tartu was awarded to Lippmaa in 1930. (50, 51, 52)

Aleksander Tamsalu first met Theodor Lippmaa in 1931. The circumstances are not clear but it may be that Tamsalu attended the First Estonian Naturalists' Day on the

last weekend of March to hear Lippmaa report on the state of botanical research in Estonia. During his speech, Lippmaa stressed the need for monographical investigation of the flora "that would make it possible to publish a critical flora of Estonia". He also charged his graduate students (Pastak, Salasoo, Sirgo) with the task of publishing more local floras like the one he was preparing on Pärnumaa. (44)

At some point Lippmaa read Tamsalu's "Saaremaa and "Hiumaa" manuscripts. He must have been impressed by Tamsalu's data-gathering activities because by that summer he had invited Tamsalu to become a member of his research team. Lippmaa could not afford to hire him full-time nor, for reasons soon to be explained, could he take him as a graduate student. The proposal was that Tamsalu would be paid to collect data during the summers, but would return to public school teaching in the winters. Just as his fortunes seemed exhausted, Tamsalu was suddenly confronted with a magnificent opportunity. He accepted and spent the rest of the summer studying Lippmaa's works in preparation for the next summer's assignments.

One of the first points of discussion with Lippmaa was Tamsalu's education. Lippmaa believed Tamsalu had the potential to earn his doctoral degree and evidently would have preferred to have his new colleague on staff as a graduate student. However, that prospect was not possible at the time.

Tamsalu was barred from doctoral work for two reasons. First, he could not produce his *Matura*. At European universities, including the University of Tartu, a candidate had to present his *Matura* or "maturity certificate" before any kind of degree work could be attempted - whether or not post-graduate certificates could also be provided by the candidate. That mandatory document was still in Russia, having been turned over to the Institute of Agriculture when Tamsalu had enrolled. In his exuberant rush to get out of the country in 1921, Tamsalu had neglected to bring his certificate with him. The *Matura* regulation, though superficially an inverted priority, was well-intended to preserve the integrity of university credentials. It was sacrosanct. Not even a man of Lippmaa's status could obviate it. (117, 123)

The University of Tartu.

Secondly, it seems the problem of accreditation had arisen again. A master's degree had always been prerequisite for doctoral work. In the early 1920s, this requirement was changed at Tartu by the Faculty Council of the University. Because the Russian Agricultural Institutes required a rather substantial diploma thesis based mostly on the student's experimental research, a resolution was passed which equated the "graduate diploma in agronomy" with the master's degree. Thus, Tamsalu technically had the educational requirements to do doctoral work. Although he had still not received his official diploma, he was able to show the transcript certificate which verified his course of studies.

However, the question was raised as to the validity of his credentials. There was, of course, as previously mentioned, the problem of relaxed standards during the time when Tamsalu was studying. But to complicate matters, his transcript did not categorize his subjects according to which were high school and which were college level courses. Since most Estonians had left Petersburg at the first hint of the Estonian bid for independence, Tamsalu had the predicament of not being able to locate a single fellow countryman who could testify to his even having attended the college level of the Institute of Agriculture.

Tamsalu began writing to the Institute of Agriculture inquiring after the whereabouts of his *Matura* and seeking clarification on the status of his diploma. There was no reply. The former Institute of Agriculture had been absorbed into the estate of the Agricultural Institute of Leningrad. Also, many of Tamsalu's former contacts at the Institute had long since been liquidated. Of course, Tamsalu did not understand these facts until much later. Vainly, but resiliently, he churned out the one-sided correspondence, trying one avenue after another. The task became almost a hobby. It took nearly nine years and much expense before results finally came from the Soviet Union.

Tamsalu's lot in the public schools improved, though in a minor way. During the winter of 1931-32, he was able to leave the post at Leisi and teach instead at Kuressaare, the capital of Saaremaa.

In the spring of 1932, his research with Lippmaa began. Tamsalu attended a series of meetings and field trips with Lippmaa and the dozen or more botanists that comprised his staff. Lippmaa drilled his colleagues in the methods of vegetation analysis they were to follow. The drill was to become an annual ritual. He also discussed a new theory he was developing - the "Unistratal Theory" based on the concept of "unions" or "synusia". The Unistratal Theory, a revolutionary idea conceived entirely by Lippmaa, was fundamental to Lippmaa's method of analyzing vegetation. It had been distilled from intensive analysis of a major part of the literature on plant sociology with particular attention to such authors as Braun-Blanquet, Du Rietz, Kujala, Raunkier, Rübel, Sernander, Tüxen, Gams and Regel. The following year, the Unistratal Theory would be explained in a publication which would quickly become the *vade-mecum* for the study of Estonian and northern European vegetation. It was to be titled: *The Methods of Research into Plant Associations and the Fundamental Outlines of the Classification of Estonian Vegetation* (1933). The reasoning behind the theory was elementary. He declared it was not possible to understand the complexities of plant communities if one insisted upon accepting all the material of a given sample plot as if it were a single complicated unit. It was necessary, he claimed, to study each layer (tree, shrub, herbaceous, moss) as an independent community and the whole sample as a complex of communities. He reasoned that each element of a given layer was much more closely related to its unistratal associates than to elements of another layer. Thus, the tiny communities of mosses and herbs were seen as more dependent upon microclimatic or "local" factors than shrubs or trees - that they would develop in their own successional patterns, little influenced by the particular taxa in the other layers. Lippmaa also placed much emphasis upon habitat in analyzing com-

munities. In other words, the presence or absence of indicator plants was not considered the only criterion of a given community. Habitat was also a determining factor. These were some of Lippmaa's main divergences from contemporary thought. He also made changes in terminology and developed his own method of naming plant communities. (53, 22)

Except for his division of communities into strata, the analysis method used by Lippmaa was a modified version of the total estimate method developed by Braun-Blanquet. The researcher was required to survey an area in detail until he could confidently select a sample plot of predetermined size, which was representative of the stand under consideration. He then divided the sample according to natural layers and described the status of each species in each layer using two scales of measurement: the first, a combined estimate of abundance and dominance (roughly "percent of cover"), a six-point scale; the second, a description of manner of growth or "gregariousness" (the tendency toward clumping), a five-point scale. Each scale point was represented by a number or "symbol". Thus, the status of a species could be represented by two symbols separated by a dot or "mark", e.g. *Pinus sylvestris* 2.1, *Hepatica triloba* 3.2, etc. A list of species with such estimates accurately portrayed the structure of a multi-layered community to anyone familiar with the scales. Such a list was referred to in the singular as an "analysis". A well-trained researcher like Tamsalu could perform up to 20 such analyses in a single work day. (A more detailed account of the method is given in Appendix I).

The method was admittedly subjective, but subjective methods were readily accepted in Europe. (In America they were generally viewed with disdain). Nevertheless, to counter objections Lippmaa trained his workers to consistency. Any two of his researchers would produce remarkably parallel results when assigned to analyze a given plant association. Tamsalu did not hesitate to claim that he and Lippmaa were more closely united in their estimates than anyone else on the team.

When the 1932 summer assignments were meted out, Tamsalu was sent back to Saaremaa, the area with which he was most familiar, to study the vegetation of the Sõrve peninsula. This study was an immediate concern. The peninsula, the southernmost extension of the island, was already heavily populated and what was left of the natural vegetation had been severely degraded through intensive land use. A complete inventory was necessary if the botanical history of the area were ever to be retraced. For one man, this was an ambitious project.

Tamsalu was given a standard letter of introduction from the University which explained his work and requested free room and board wherever it was presented. Throughout the summers of 1932 and 1933, he worked his way along the 35 km length of the peninsula, analyzing the plant communities, mapping their distributions and collecting specimens.

Tamsalu now joined at least three scientific societies: the Estonian Naturalists' Society, the Baltic Plant Geographic Society, and the Nature Preservation Society of Saaremaa and Hiiumaa. (By 1935 he was vice-chairman of the latter association). Many of the scientific societies sponsored journals. Working with Lippmaa gave Tamsalu an even better access than his memberships afforded to publish in those journals. Under Lippmaa's prodding he made good use of the opportunity, for in 1933 he published three articles - mostly on the collected sightings of rare plants which he had made in Hiiumaa and Saaremaa between 1926 and 1930. (131, 5, 6, 7)

After concluding the 1933 field work, Tamsalu decided to move back to the mainland. Julia remained at Kuressaare with the children so that they could complete their school year uninterrupted. Tamsalu terminated the lease agreement at Karjasmaa and in the spring of 1934, the family, minus Aleksander, returned there. He had business elsewhere.

He continued to teach public school during the winters although he later made little mention of that fact. Despite his protests, he was assigned a teaching position as a head--master in the small, remote village of Kanaküla in southern Pärnumaa. Although Kanakula was closer to the University than he had ever lived, he naturally regarded the years there almost as banishment from civilization. He was so sensitive and embarrassed about this period that in his many volumes of writing he never mentioned his years of association with the village. Only rarely did he claim his teaching experience on any job application or in any of the brief autobiographies he wrote. In fact, he took every convoluted measure, short of outright falsehood, to create the impression that he was with the agricultural schools throughout the 1930s. Though the exact dates are unknown, he probably worked at Kanaküla from as early as 1933 until as late as 1939. The only information he ever volunteered was that he had been headmaster of two public schools.

Tamsalu had several tasks to command his attention during the summer of 1934. Following the customary spring review field trips with Lippmaa, Tamsalu went back to the Sõrve peninsula to recheck his data from the previous summers. Then he spent several weeks in floristic studies: dot-mapping the distribution of European globeflower (*Trollius europaeus*) in Saaremaa and cataloguing the salt-loving plants or "halophytes" on the island of Muhu.

The same year, Lippmaa launched another undertaking. He and his workers began the long-term project of compiling a complete vegetation map of Estonia. The project was Inspired by a resolution of a previous International Botanical Congress which called for the vegetation mapping of all of Europe to be accomplished during the decade of the 1930s. Tamsalu later explained the project: [Each] country carried [the mapping] out in different ways. In … Estonia we [incorporated it into] the large on-going plant sociological study ... We used, for field works, topographic military maps in scale of 1" = ½[verst]*. Our vegetation map [comprised] two main maps: a.) The map of Present Vegetation, including tree, shrub, herbaceous and moss layers, and b.) the Map of Reconstructed Vegetation, which indicated what kind of virgin forest was there before the settlements … The latter was completed mainly on the basis of indicator plants ... together with soil maps. It was the most interesting part of the study because it required a knowledge not only of botany but of many other principles ...". (74)

In all, 67 researchers contributed to the vegetation mapping project over a span that extended well beyond the Estonian independence period. Among Lippmaa's original staff were such names as Aasamaa, Barkla, Eichwald, Eplik, Kaaber, Lunts, Pastak-Varep, Ruhl, Saarsoo, Salasoo, Sirgo, Sits, Vaga, Vilberg and, of course, Tamsalu (Tomson). All of them remained unknown in North America, but late in their careers many became prominent in northern Europe for their specific endeavours. Among them, Tamsalu emerged as one of the keener workers. Henrik Aasamaa, now of the Estonian Research Institute of Agriculture and Land Improvement, recalled Tamsalu's ardent approach to his assignments:

> "I remember Aleksander Tamsalu (Tomson) because we were both engaged in an extensive project of mapping Estonian vegetation ...
>
> "Aleksander Tamsalu was one of few workers in our group who could work in the field from early in the morning until late at night, day after day. He mapped more than twenty 10 x 10 km^2 areas and described the vegetation of Hiiumaa ...
>
> "Aleksander Tamsalu enjoyed field work. He could easily distinguish correctly and describe vegetation types. His enthusiasm and love of nature inspired all of us". (113)

*The *verst* was a Russian measurement approximately equal to 1066 metres.

There were good reasons why Tamsalu's productivity outstripped that of his colleagues. He mapped primarily in the islands and in the Pärnu district. Thus, the grassland projects he had done a few years earlier and Lippmaa's extensive work in Pärnumaa (Tamsalu's home county) gave Tamsalu a foundation from which to work that his colleagues did not have.

He had one other advantage, namely, help with his graphics. His daughter recalls that he would often return to the farm after a mapping excursion and conscript his eldest son, George, to spend countless evening hours shading the large vegetation maps in coloured pencil. Assuredly, George would rather have spent the evenings to social advantage elsewhere. While George worked under a watchful eye, his father would write the accompanying manuscript - an average of 30 pages of text for each map.

In the opinion of Liivia Laasimer, who eventually became one of Lippmaa's most accomplished graduates, Tamsalu's manuscripts were "knowledgeably and thoroughly written". But the material was purely descriptive, exactly according to the instructions worked out by Lippmaa. Innovation was not Tamsalu's prerogative. (116)

His claims regarding the amount of work he did are astounding when compared to the output of his associates. "During seven years of mapping," he wrote, "I completed 8,500 square kilometers of the maps and 2,500 pages of text but these results were far ahead of [my associates] because the area which I studied was very familiar to me and had been studied in plant sociology in many parts". (74)

One must put Tamsalu's claim into perspective. Although he did not elaborate, he probably completed 85 vegetation maps which, multiplied by the total surface area of each map, covered 8,500 square kilometres. If a 100 sq. km grid is placed over a map of Estonia, one can clearly see, for example, that the island of Saaremaa, with a land area of 2,700 square kilometres, would require at least 45 maps for complete coverage. Due to the irregularity of the coastl.ine, 40 percent of the area of the Saaremaa maps would be occupied by open water. Similarly Hiiumaa (965 sq. km) would have required at least 16 maps, and Muhu (only 200 sq. km) could not have been covered with fewer than four. Assuming, then, that Tamsalu was responsible for mapping all three major islands - and this does seem probable - these could have accounted for 65 of his 85 maps. The remainder would have been done in Pärnumaa and perhaps neighbouring Viljandimaa beginning about 1936. (47)

A measure of how far Tamsalu was ahead of his colleagues in the project is indicated in that of all those people involved, only two others, Liivia Laasimer and J. Eplik, surveyed more than 20 maps and the great majority did far fewer than 10 each.

Lippmaa grew ever more impressed with the volume and accuracy of work from his most trusted disciple. Tamsalu was acutely aware that an unique relationship was developing with Lippmaa. That relationship brought Tamsalu into the role of devil's advocate to the Unistratal Theory.

Tamsalu explained in the following way:

> "How strong I am in theory is a question in itself ... but I know how to analyze and, in Lippmaa's family, I was strongest in this field. My analyses were always united with his. When, for a few weeks each spring we went together on hikes, they became closer and closer". (67)

> "While Lippmaa was developing [his] theories, [I] carried on field works discovering always new problems which sometimes seemed to be in conflict with [the Unistratal] Theory. This was the reason why Lippmaa's theory was elaborated very carefully and spread rapidly over ... Europe". (81)

> [With Lippmaa] "there really developed trust and friendship in his later years" (the late 1930s). (88)

Tamsalu's rapport with Lippmaa may have progressed well, but in 1934 his affiliation with the Education Ministry plummeted. Late that year, after the autumn semester had begun, an anonymous provocateur at Kanaküla discovered that Tamsalu could not produce his maturity certificate. This was true. After more than three years of letter writing, Tamsalu still had had no reply from the Institute in Leningrad. A complaint was lodged with the school board which in turn cut Tamsalu's salary on the contention that his lack of a certificate cast aspersions on his "higher education". Tamsalu launched a lawsuit. This litigation dragged on for over a year, but he eventually won. It was not a totally satisfying victory. In his decision, the judge declared:

> "I think that based on his transcript it seems that the plaintiff A. Tomson (Tamsalu) has a complete higher education, but the paragraph in the educational by-laws regarding the amount of pay demands that he also show his secondary school documents which A. Tomson up to now has not done. Thus his demands for backpay will not be fulfilled". (69)

Although the court decision served as legal proof of Tamsalu's "higher education", it was not a substitute for academic accreditation. The University of Tartu continued to insist that Tamsalu produce his maturity certificate and more details concerning his transcript before he could be considered for doctoral work.

Throughout the mid-1930s, Tamsalu published lightly but regularly. Between 1934 and 1936 four of his papers appeared in *Eesti Loodus* (Estonian Nature), the bimonthly journal of the Estonian Naturalists' Society. The papers included his 1934 research on the distribution of globeflower in Saaremaa and material on the halophytes of Muhu, as well as collections of floristic notes on rare and unusual plants. But the real breakthrough for Tamsalu came in 1937, the year he published his work on the Sõrve peninsula. The work would have been released much sooner but for the reason he outlined in its foreword: " ... The intensive enriching of applicable literature in the last few years has made it possible to rework the original descriptive treatment into a comparative one, for which it was necessary to carry out on-the-spot corrections and re-do the initial writing". (8, 9, 10, 11, 12)

If Tamsalu ever had his moment in the spotlight, it came with his publication of this 87-page treatise entitled *Sõrve taimkate* (The vegetation cover of Sõrve). It appeared early in 1937 in *Eesti Loodusteaduse Arhiiv. 2. seeria*, and was reprinted in the prestigious journal *Acta Instituti et Horti Botanici Universitatis Tartuensis*. A three-page abstract in French instantly placed the work within reach of all of Europe and consequently publicized Tamsalu's name. (12)

When the paper reached Finland, Professor K. Linkola, of the University of Helsinki, offered Tamsalu double his Estonian salary if he would come to Finland and train Finnish investigators in the Lippmaa method. Tamsalu declined. Not only was Lippmaa's influence over Tamsalu very powerful, but Lippmaa had given him a new assignment which augured important prospects for the future. (81)

Lippmaa, in assessing the botanical works of the 1930s, was already envisioning new and broader research tasks involving interdisciplinary co-operation. In 1938, he would publish an article outlining his intentions. Meanwhile he charged his indefatigable coworker with a preliminary responsibility: to work out a master-plan for the collective research of all Estonian grasslands which would involve the collaboration of agronomists, botanists, chemists, physicists and members of many other disciplines. It has already been emphasized that, despite his talents for organization, Tamsalu's plans were often overly ambitious and unsuited to existing limitations. In this case, no one could have been better suited. Lippmaa expected ambitious planning. (54)

The prospectus for the collective research project was finished that same year and turned over to Lippmaa. It was not completed without cost to its author however. The sheer strain of his workload, in this year of decisions, took its toll on his health. The rush to meet the publishing deadline for *Sõrve taimkate* plus a full schedule of field work, including mapping, all contributed to the burden. Also that summer he, with many other Estonians, submitted to nationalistic and social pressures and chose a new Estonian surname. It was the "grasslands" assignment from Lippmaa that pushed Tamsalu over the brink. He became ill with severe digestive upsets that literally doubled him over with pain. The problem was diagnosed and eased with medication such that he was able to put it out of his mind temporarily. Yet, in subdued form, the debility remained with him. Twice during his life violent attacks would recur, both times when he was under heavy stress. In spite of the consequences to his health, Tamsalu's relentlessness in preparing the grasslands research prospectus, was to pay impressive dividends. (129, 88)

By the late 1930s there were numerous scientific societies extant in the Republic including the Naturalists' Society, the Society of Estonian Agronomists, the Society of Estonian Physicians and the Estonian Learned Society. Most were connected with Tartu University. Nearly all published at least one journal. In 1938, the Estonian Academy of Sciences was established. Comprising a committee of professional scientists, its purpose was to co-ordinate the scattered activities of the scientific societies, and to promote the sciences, especially those with practical application to Estonia.

No project could have been more pertinent to the aims of the Academy than Lippmaa's work on Estonian vegetation. And, since Lippmaa was the first elected Academy member, he made it a priority to bring his project under these new auspices. Thanks to Lippmaa's research team, the vegetation of Estonia was already more thoroughly mapped and analyzed than that of any other European country. Lippmaa now began broadly promoting his opinions on interdisciplinary co-operation as the next logical step in the studies.

Mobilizing the Academy and establishing priorities took time. Indeed it was well over a year before Lippmaa's plans were manifested. In the meantime, Tamsalu continued his research work. In addition to his mapping duties, he published some floristic notes in 1938 and spent 1939 preparing two new papers for publication the following year - more floristic notes, plus a special study on the distribution of species of *Astragalus* and *Gypsophila* in Viljandimaa. (13, 14, 15, 16)

During the last part of that decade, as the practical value of Lippmaa's research was felt, the Department of Agriculture worked more and more closely with the research team. It became commonplace for the Department to confer with Lippmaa on any matters pertaining to land-use policy. Tamsalu was often drawn into such discussions. When the Department was reminded of Tamsalu's broad experience in both teaching and botany, he was honoured by being commissioned to write a new text book of botany for the Estonian Agricultural and Horticultural High Schools. Tamsalu may have considered the new project less an honour than an imposition for it kept him away from his plant sociology writing for the whole winter of 1939-40. The 240-page manuscript was approved by the Department the following spring and was sent to a publisher. (17)

The completion of the manuscript was far less important than two other events that spring. Tamsalu's maturity certificate arrived in the mail from Leningrad. At last, one of his letters had fallen into the hands of a former classmate who had taken the trouble to locate the document. At the same time, the question of his accreditation was also resolved although details of that matter remain sketchy. These verifications could not have arrived at a more opportune moment. (119)

It was commonly believed that Lippmaa ended his phytosociological work in 1940 because the political-military turmoil generated by the opening shots of World War II interfered with field work. According to Tamsalu, it was well known to a few Tartu staff members (N. Rootsi, L. Enari) that Lippmaa had been rekindling his interest in the ecological role of plant pigments and simply chose to return to laboratory work. To free himself for those interests, he wanted to pass the bulk of his phytosociological studies to a successor. Thus, the Academy established a position for a "botanical research director" to take over the Lippmaa research at the Botanical Institute of Tartu University. Lippmaa recommended Tamsalu for the job. (58, 67)

Lippmaa's evident eagerness to secure the position for his colleague may have quelled whatever formal questions remained. Tamsalu turned over all his educational documents Lippmaa who relayed them to the Academy, along with details of Tamsalu's proposal for Estonian grasslands research, and a personal affirmation of his ability. Provisional consent was given in May, 1940. His appointment to the Academy, as "acting head" of the botanical research group, was to be effective on June 1st on the condition that Tamsalu obtain his doctorate that same year. Lippmaa presented a manuscript written by Tamsalu indicating that with some supplemental work it could be made an acceptable dissertation. His oral defense of the dissertation was scheduled for November. Another condition of his employment was that until he obtained his doctorate Tamsalu would receive only three-quarters of the established monthly salary. (This reduced salary was still double the average wage for male workers in all occupations. He was also to receive a very substantial travel allowance). (119, 126)

There is strong indication that Lippmaa intended to keep at least a figurehead role in the Estonian vegetation project. Nor did he intend to relinquish formal control until he had first moulded its structure, both programme and personnel, to his own liking. Research was to commence in the second half of June with an investigation of the swamp forests and meadows of the Pedja flood plain along the Ema River. At the beginning of "he month, Lippmaa hired an assistant for Tamsalu and sent the two of them to the town of Põltsamaa in the Pedja region. There Tamsalu was to check the accuracy of vegetation maps drawn in 1935 by V. Sirgo, one of Lippmaa's other workers. As usual, he took military maps with him for topographic reference.

Clearly Tamsalu had little to do with setting up his own department. In his absence, everything was handled by Lippmaa. He chose Tamsalu's staff and even decided who would collaborate in the works. On returning from Põltsamaa, Tamsalu was to take the reins of a fully operative research unit that had Lippmaa's personal stamp of approval.

It is useless to speculate what Tamsalu might have accomplished over the next several years from his new position of authority. For what appeared to be a major threshold was actually the highest peak of achievement he would ever reach. Estonia was doomed; and with it, all of Tamsalu's potentials. His botanical textbook would never "see the black of print". After 1940, he would never again publish in a high calibre journal. And at the Academy, his tenure would collapse within only a few weeks.

Aleksander Tamsalu in Kaitseliit *uniform, Pärnu, 1936.*

IV

TURNING POINT

The fate of the Estonian Republic had been sealed in August, 1939, with the signing of a so-called non-aggression treaty between Germany and the U.S.S.R. The Baltic Republics were secretly assigned to the Soviet orbit and, shortly thereafter, the Soviets imposed pacts of "mutual assistance" upon each of them. A series of opportunistic political and military manoeuvres led to a Soviet ultimatum delivered to Estonia on June 16, 1940, just when Germany was occupied with the Battle of Britain, and the fortunes of the Allied forces had reached their lowest ebb. The ultimatum demanded a new Estonian government which would be more co-operative in fulfilling the terms of Estonian-Soviet mutual assistance. The following day, the Red Army occupied the whole Republic and days later a puppet government under Johannes Vares began to disassemble the trappings of independence.

The military occupation caught Tamsalu while he was still at Põltsamaa. But he continued to go about his business incognito until two days after the event at which time he was arrested by Russian troops. When they discovered he was carrying military maps, an interrogation ensued - a physically brutal one according to rumour - and it was only through the help of the Estonian military that he managed to escape and flee the area.

Tamsalu returned to Tartu but within a few weeks the Academy of Sciences was dissolved by order of the Vares government. He was dismissed. The educational and employment documents that he had given to Lippmaa, and Lippmaa had passed on, disappeared in the subsequent bureaucratic shuffle. He never recovered any of them.

Late that summer, he went to see Dr. Joosep Nõu, head of vocational agricultural and horticultural schools at the Ministry of Education in Tallinn, about a possible teaching position in the school system. He was accepted, and that autumn began lecturing at the agricultural school in Vahi, a town just north of Tartu.

Moscow incorporated Estonia into the Soviet Union on August 6,1940, and a ruthless sovietization began in which communist systems and policies were enforced upon the people. Among the measures taken was that all private ownership of land was abolished. Thus, the Tamsalu farm officially became the property of the Soviet government, although the family was allowed to continue living there to keep it in production.

For the Soviets, suppression of resistance was paramount. The *Kaitseliit*, or "Defense League", posed the single greatest threat to Soviet control. The sheer numbers alone were cause for concern: fully one-fifth of the male population belonged to that private army. Thus, to disarm the civilian population became the first objective. On taking control of Tallinn, the Russians immediately siezed the firearms registers. Aided by those lists, they were able to confiscate 90 percent of the firearms in private hands within only two days.

With the *Kaitseliit* emasculated, reprisals followed rapidly. Reactionaries and suspected reactionaries, including *Kaitseliit* leaders, were prime targets. During the twelve months of occupation, 60,000 Estonians of all classes and ages were killed or deported through the efficiency of the secret police. Even the agricultural schools received strongly worded warnings, as Tamsalu expressed it, "to feed the pigs and milk the cows in the true spirit of Marxism". Although he had to work with, and take orders from, Marxists who had been appointed to senior positions in the Ministry, Tamsalu kept a low profile at Vahi. This feat alone was nearly miraculous. (One senses that he bit his tongue frequently). Perhaps in January or February of 1941, there was reassignment among the staff at Vahi, and Tamsalu found himself in the position of "assistant to the director". (95, 126)

On the scientific front, by May, 1941, Lippmaa had once again decided to turn over responsibility for the vegetation mapping project to Tamsalu, this time independently of the defunct Academy of Sciences. At that time he seems to have handed over a massive quantity of apparently duplicated material including copies of field books containing 3,000 analyses which he, Lippmaa, had performed over the years since 1931. Although Tamsalu never realized it during the remainder of his life, the original field books had already been placed on file at Tartu. According to Tamsalu, Lippmaa wanted him once again to begin independent research on June 14, 1941. However, around that date the Department of Agriculture ordered Tamsalu to report to a tractor station at Vändra, a small town about 45 km north-east of Pärnu. The director of that station had just been ordered deported and Tamsalu may have been needed to impose some organization during the peak of the sowing period.

The events that transpired from that time on ended any hope of Tamsalu resuming the vegetation mapping project that year. He was still at Vändra when, in the early hours of June 22, German forces invaded Soviet occupied territory and began a sweep north through the Baltic Republics, forcing the Russians to back out of their occupation zones. By July 7, the Germans had pushed into Estonia and had soon established a front along the Pärnu-Viljandi-Tartu line. The front actually passed very close to Karjasmaa. (67, 80)

Shortly thereafter, and quite unexpected by his family, Tamsalu appeared at the farm on his bicycle, thoroughly exhausted, with a wild tale about how he had yet again escaped Soviet clutches. When the invasion had begun someone - he never learned who - expressed suspicions about his political views to Soviet authorities. He was tipped off by a friend that the secret police were on their way to arrest him. That warning saved his life by providing him a head start in his escape. Abandoning almost all his possessions, including what were left of his personal documents, he began peddling his bicycle toward Pärnu. The Soviet police came after him on motorcycles. But Tamsalu had the edge. He had mapped some of the terrain and knew it almost as well as he knew his own farm. After less than an hour on the road, and just before his pursuers could catch up to him, Tamsalu disappeared, bicycle and all, into a forested bog where he could not be followed. By staying in the network of bogs between Vändra and Pärnu and gradually working his way south, he managed to avoid contact with the Red Army units scattered over the countryside, and to get to the comparative safety of home behind the German line.

In Tamsalu's absence, Karjasmaa had been under observation by the Soviets - with good reason. During the Soviet occupation, George had been using the farm as a local communications centre for the *Kaitseliit*. However, the Soviet agents had apparently not been able to connect him with any of the minor acts of sabotage perpetrated in the Pärnu area. Agents had, however, come to the farm looking for Tamsalu - probably notified by the same informer who had caused problems for him at Vändra. Until the Soviet forces had been pushed across the eastern border, Tamsalu knew he would remain in grave danger. The situation remained tense as the German advance was inexplicably delayed for weeks along the Pärnu-Viljandi-Tartu line.

The Germans had set up a line of artillery near the schoolhouse off the northern boundary of the farm. Over a period of more than two weeks that position was captured and recaptured several times. Armed only with a small calibre sporting rifle and Aleksander's *Kaitseliit* revolver (both of which had mysteriously escaped confiscation) the Tamsalus could do little but watch from the farmhouse. At night someone was always awake, on guard for the small groups of soldiers they suspected would be out plundering. It was the end of July before the German forces once again pushed northward and east leaving German-occupied territory in their wake. A more normal daily routine could at last be resumed. The Germans made no attempt to return Soviet-nationalized land to the original owners. They simply declared such lands to be German war booty. Farmers were allowed to remain only as tenants and operators on what were now German state-owned farms. Tamsalu stayed at the farm out of necessity until spring of the following year. During the Russian occupation the farm had been repeatedly pillaged, the barn ransacked. Most of the livestock and much of the outside equipment had been stolen, damaged or confiscated for the Soviet war effort. As Tamsalu put it, the farm needed his full attention to "organize it back into one unit". (126)

Then in May, 1942, the Department of Agriculture, now out of Russian hands, called him back into service to take a special assignment. For four months that summer, Tamsalu worked as the leader of a team of investigators searching the Pärnu district for peat deposits that could be used as an alternative fuel source to ease the shortages that had been intensified by war. At the same time his crew surveyed convenient locations ... for a new solid-fuels electrical generating station. ... "Contingent with the search for peat as fuel, the research team carried out a detailed study of the peat bogs - their origins and composition - presumably so a permanent geo-botanical record could be filed before they were mined. That research continued intermittently through the summer of 1944, but no publications on the findings have ever been located. (126)

With the arrival of September, 1942, Tamsalu was appointed "Inspector of Fuels" for Pärnu county. Every county had such an inspector. Such jobs were typical of those contrived during the German occupation to employ the unfortunate but skilled people who had lost their former positions due to the war. His eagerness to accept such a post may suggest how reluctant he was to return to public school teaching.

This job was partly a continuation of his summer work. His responsibilities included allocation of fuels and procurement of firewood. At the same time, he also assumed the title of "Senior Consultant of Soil Conservation and Amelioration" for the counties in the northwestern quadrant of Estonia. In this he supervised over a dozen field agronomists and oversaw projects involving land improvements and compiling card indexes for registered farms. Tamsalu took an office in the county government building in Pärnu with a secretary and two assistants. To do this he had to live in an apartment in Pärnu; commuting daily from the farm by bicycle would simply have been too time-consuming. This was the beginning of yet another separation from Julia. For two more years he saw her only on weekends and vacations. There was no choice. It was the price of having a salaried job. Aino lived with him during the winter months while attending school, but returned to the farm during the summer to help her mother.

Tamsalu must surely have yearned for the war to end so that he could once again resume the project of mapping Estonian vegetation. But over a period of two years, that dream was torn away in pieces. The first blow came on Wednesday evening, January 23, 1943. The Lippmaa's were still living at the Tartu University Botanical Garden in an apartment which was attached to a classroom, botanical laboratories and the conservatory. On that fateful evening the Russians launched a terror raid on the city of Tartu.

Tartu was a cultural centre with no strategic importance. The raid was intended to demoralize the civilian population and demonstrate the peril of further resistance. A squadron of bombers dropped fewer than a dozen bombs indiscriminately on the city and disappeared into the night. It is theorized that moonlight reflecting from the conservatory greenhouses beside the Lippmaa apartment provided an unusual target. In a blinding flash, the apartment, conservatory and half the botanical garden were disintegrated. The whole Lippmaa family perished, except the eldest son, twelve year old Endel, who had been at the cinema. (115)

Thus Estonia lost one of her most distinguished scientists and a chapter in the history of phytosociology reached an abrupt end. Rarely has one man had such an impact on the science of his country. Until long after his death at age 50, Lippmaa remained the soul of Estonian botany. Today he retains an eminent place in the study of Estonian vegetation. In just over 20 years, he had published 83 works, both books and articles, about 30 of them on plant sociology. A final work would be published posthumously in 1946 - ironically in the Russian language. He had travelled on four continents and his herbarium collection, now on file at Tartu, spanned flowering plants, lichens and mosses of Estonia, the Altai mountains, Lapland, France, Algeria, the U.S.A. and Canada. Most important, his methods and theories had left a permanent impression on vegetation studies in northern Europe.

With Lippmaa's death, Aleksander Tamsalu lost his mentor and close personal friend — the man whose opinions and ideas he valued almost reverently. He reacted to the death as if Lippmaa had been a member of his own family, focusing blame and further hatred on Russians in general, and Communists in particular. There was abundant, volatile fuel for the propaganda he was writing for the *Kaitseliit*.

Before the German occupation, Vello had also joined the *Kaitseliit* in Pärnu. However, with the Germans now in control, the *Kaitseliit* also fell under their command. The draft came into effect. Vello's unit was ordered changed into a defense battalion, with the promise that it would be required to operate only in its own locality. Any promise soon crumbled as conditions deteriorated on the Russian front. Eventually the Pärnu battalion, newly designated as "military police", was sent to Russia, near Leningrad, where Vello fought throughout the winter of 1943-44.

George had enrolled at the University of Tartu. This action initially freed him from the German-imposed draft. Attempting to give him further draft protection, Aleksander signed over to him the tenancy rights to Karjasmaa in the hope that farm operators would be considered essential to the German war effort. It was a tenuous protection indeed. The only other way George could have avoided the draft would have been to join the legions of men who were hiding in the forests. In fact, George was never drafted, nor was Aleksander ever called into action. Employment in an essential service, not to mention his age, prevented that.

The year 1944 marked the nadir of Tamsalu's life for in that year he suffered not only the decimation of his family but also the loss of his job, his research data, his personal possessions, the farm and, indeed, his country.

In February, the Russians once again attempted to invade Estonia. A battle front formed at Narva. The Estonian military forces, including Vello's unit, fought to hold them back. A state of panic seized much of the population, especially the influential, and masses of Estonians, over 63,000 in all, escaped by sea to Sweden and Germany. The family could have been evacuated to Sweden at that time, but Tamsalu would not leave. His loyalty to Estonia was too deeply ingrained and he would not prematurely abandon his position in the *Kaitseliit*.

That same month the military closed and took over all of the school buildings in Pärnu; so with the academic year ended, Aino went back to the farm leaving her father alone at the apartment.

The first of several personal tragedies struck on March 3. Vello was killed in action in tie battle of Sinimäed near Narva. He was only 22 years old. In spite of the fact that the body had been interred at the battlesite, Tamsalu insisted that it be returned to Pärnu. A tribulating and macabre sequence of events followed. At risk of his own life, Tamsalu went to Narva in late March to personally supervise the exhumation. He then used connections in the Ministry of Transport to contravene railroad freight regulations by having the casket crated and shipped back to Pärnu as regular cargo.

Left: Aleksander, Aino, Julia and George Tamsalu. March 26, 1944. Right: Vello Tamsalu In Kaitseliit *uniform shortly before he was killed in action at Sinimaed.*

Returning to Pärnu, he consulted with the military on funeral arrangements, but after several days the casket still had not arrived. It was later discovered that the crate had been diverted to Tallinn instead of Pärnu,, but this was learned only after Tamsalu had gone off himself to retrace the route. Finally the error was rectified and on April 23, Vello was reinterred with full military honours in the "Cemetery of Heroes" at Pärnu.

As would be expected, the family was deeply shaken by this trauma but for the Tamsalus these events merely set the tone for the remainder of the year. Estonia remained under siege and by late summer even the most die-hard nationalists had to concede that the country was in imminent danger of collapse. Early in September, George, the only survivor of three sons, sailed one night for Stockholm on a boat which belonged to some fishermen with whom the Tamsalu family had traded. George was to make arrangements for the family to settle temporarily in Sweden. When these were completed, he would return to Estonia to await the outcome of the fighting and, if necessary, help with the evacuation. But time ran out on Estonia and the Tamsalu family. George never returned. Because the Baltic Sea was heavily patrolled by German coast guards, they feared he had been intercepted - and, if that were so, shot. It was well over a year before they learned that he had reached Stockholm safely. Although from that time onward he corresponded with his father by mail the two never saw each other again.

If he had been an ordinary senior civil servant or intellectual, Tamsalu might have faced deportation under Soviet rule. But as a member of the *Kaitseliit*, and known by now for his anti-Communist activity, capture would have meant certain death for him

and probably his immediate family. In view of the danger he was in, he left his escape perilously late. September 22 was the day Russian troops entered Tallinn and terminated the Estonian government that had been appointed upon the German withdrawal. Tamsalu phoned Karjasmaa and described to his wife the scene of desolation in Pärnu: the government offices had been vacated; those government employees who chose to remain were frantically burning their identification papers and records; much of the civilian population had left the town.

Tamsalu reluctantly acknowledged that it was time to go. While he cycled back to the farm, Julia and Aino worked out the priorities of packing a few belongings and loading them on the horsedrawn farm wagon. They hoped somehow to reach Sweden and none of the family really believed that they would be away from home for long. They were confident the western allied nations would force Russia to return Estonia to its former nationhood as soon as the war was resolved. This was a gross error.

The standard shipping rules were that each refugee could take aboard only two suitcases. The Tamsalus packed some irreplaceable belongings such as a few family photographs, which took little space, plus some Estonian vodka, and a handful of the sterling silver spoons that Tamsalu had brought back from Petrograd, and which could serve as a kind of international currency in the interim. However, the rest of the valuables and larger keepsakes were stacked carefully inside several steel milk cans which they buried in the yard in front of the farmhouse. When Tamsalu arrived at the farm, he gathered together a few of his education and employment documents which he had been able to replace since losing the originals at Tartu and Vändra. His published papers were left behind. He didn't feel he would need them because copies of his papers were stored in various science libraries in northern Europe.

Tamsalu had amassed an impressive botanical library including some older volumes of historical interest. He owned books in eight different languages - autographed presentation copies from some of the most influential scientists on the Continent. With reservations, these too were left behind. Of all the books he could have chosen, the only one he decided to take was Lippmaa's 1933 periodical number on phytosociological research methods. (53)

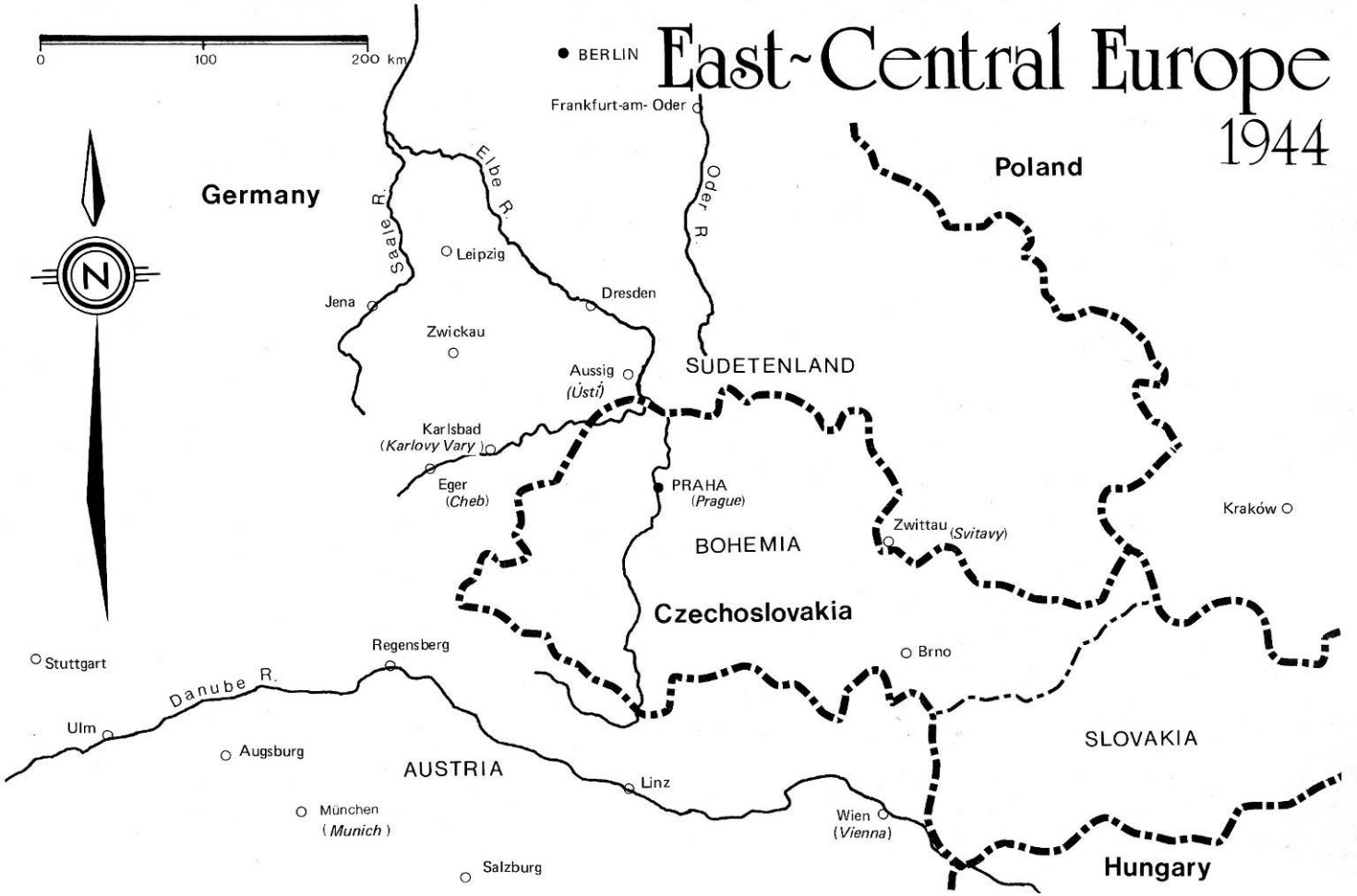
Then came the juncture at which Tamsalu made a most fateful and unfortunate decision: he had to decide what to do with the huge and unfinished work on the Estonian vegetation map - 20 years' worth of research. Much of his professional career had been devoted to it. Some of the data had already been published as short articles but most of it was unpublished. Included were 7,000 vegetation analyses (4,000 by Tamsalu, 3,000 by Lippmaa), hand drawn vegetation maps, and 2,500 pages of manuscripts. Had it been condensed and published under Lippmaa's supervision, it would have been the definitive work on Estonian phytogeography. But it needed refinement and much additional data from the other researchers who had worked on the project. Because of its bulk, the work could not be taken with him. Neither could he leave it at the house for he believed that, because of who he was, the house would be searched thoroughly by the Soviets at their first opportunity. The material was too important to risk having it stolen or destroyed. Thus in a decision that was to torture him for the rest of his life, Tamsalu packed the bundle of papers into one of the milk cans and buried it along with the other valuables. In a way it was his last blind act of faith in the durability of the nation. (19)

The farm was not abandoned. It was left in the hands of farming relatives who had been forced by the Russian front to move west from their property near Tartu. They were planning to stay in Estonia regardless of what happened politically.

So, on the afternoon of September 22, 1944, this couple drove Aleksander, Julia, Aino and Virve, a young cousin of Julia who had been visiting, back into Pärnu and left them at the waterfront. The harbour was scattered with naval ships, but when the Tamsalus inquired about passage they were told that there would be no more ships taking civilians that day. They were advised to check again the following morning.

That night there was an air raid in Pärnu. The bombing was brief and superficial. The Russians seemed mainly interested in reconnaisance of the naval strength in the harbour. Yet, as the sky blazed with flares, the Tamsalu family huddled in the darkened hallway of an abandoned house fearing that they had tried their escape too late. When the alarm was over, they returned to Karjasmaa until morning. At dawn, September 23, they went back to the waterfront. One ship had come in for passengers during the night. She was a relatively small Latvian Admiral ship. Already an ill-tempered crowd of refugees was milling around the dock. There was jostling, shouting and general commotion as everyone tried to be first in line. This was the one type of behaviour Alek Tamsalu could not tolerate. Immediately he herded the family off to the side where the four of them stood in a tightly knit group, watching the spectacle in disgust, and longing for the boarding to begin. When the gangway was finally lowered a complement of sailors in dress uniform rushed down to the dock and locked arms to form a cordon. No one was to be allowed on the ship until there was some semblance of order within the crowd. One of the sailors spotted the Tamsalus standing quietly at the side and nodded to them to go aboard. As he climbed the gangway, Tamsalu left Estonian soil for the last time - and with it nearly every concrete remnant of his past. From this point onward his life was to be an eternal and futile struggle to regain past accomplishments. For some time it would even be a struggle to survive.

Later that same day, sections of Pärnu were bombed to rubble and Russian troops moved into the town. Tamsalu was on the last refugee ship to leave Pärnu harbour. Yet its destination was cause for dismay. The ship was bound for Latvia where the passengers were to be transferred to a German freighter that would carry them on to Gotenhafen and Danzig. Tamsalu had fallen prey to the Nazi manhunt for factory labourers. It was not a pleasant prospect. Still it was better than a Soviet death sentence.


East-Central Europe
1944
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100
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N
BERLIN
Frankfurt-am- Oder
Germany
Poland
Saale R.
Elbe R.
Oder R.
Leipzig
Dresden
Jena
Zwickau
Aussig
(Ústí)
SUDETENLAND
Karlsbad
(Karlovy Vary)
Eger
(Cheb)
PRAHA
(Prague)
BOHEMIA
Zwittau
(Svitavy)
Kraków
Czechoslovakia
Stuttgart
Regensberg
Brno
Danube R.
Ulm
Augsburg
AUSTRIA
SLOVAKIA
Linz
München
(Munich)
Wien
(Vienna)
Salzburg
Hungary

V

INTO EXILE

It was a harbinger of difficulties and discomforts yet to come that the Latvian ship was heavily overloaded. Only mothers with small children were given cabin space while all other passengers had to remain on deck. On board was a small contingent of Estonian military police, including what was left of Vello's unit. They spoke in whispers of hijacking the ship to Stockholm, but they hadn't sufficient numbers to overpower the escort of German troops. The ship docked as scheduled at the small Latvian port of Ventspils (Windau).

Even had they wanted to, the Tamsalus could not have stayed in Latvia. Russian forces were now sweeping down through that country as well. On arrival at Ventspils, the passengers were separated. Women and children were sent into the town to the abandoned schoolhouses, but those accommodations were so unsatisfactory that Julia, Aino and their cousin insisted on staying in a bomb shelter with Aleksander and the other men.

Soon a German cargo ship, "Lappland", arrived for the transfer of passengers. Yet for what seemed like an eternity, the refugees remained on shore, agonizing over the advancing Russian front while red tape held up their departure. Three days passed before they were finally allowed to embark.

On both nights of the two-day journey, there were scattered bombings at sea. Other ships in the vicinity were sunk with heavy casualties. "Lappland", however, crept inexorably down the coastline unscathed. Graced by pyrrhic fortune, the Tamsalus reached Nazi occupied Danzig exactly one week after leaving Estonia.

The refugees were herded into barracks in a barbed wire enclosure. Days later, the Tamsalus were sent by rail to a camp at Frankfurt-am-Oder, near Berlin. This was a large transit camp where fugitives of all nationalities waited in an atmosphere of confusion while the authorities determined their respective fates. Those who had relatives in Germany were allowed to go to them. People like the Tamsalus who did not, were sent wherever manpower was needed.

At this Frankfurt camp, the Tamsalus lost one of their company. The Luftwaffe was exerting hard-sell pressure to enlist able-bodied teenagers of both sexes. Unknown to the Tamsalus, their cousin, Virve, succumbed to the recruiting propaganda at which point she disappeared from the camp. It was only after the war ended that they learned she had survived heavy fighting in northern Germany, escaped, and made her way safely to England.

On October 6, the remaining three family members were once again loaded into railroad cars, this time bound for Mahrish Trubau (Moravska Trebova) in the part of occupied Czechoslovakia known as East Sudetenland. Upon arrival they waited at the railway

station as they had been instructed to do. Many hours passed but no one came to meet them. Finally station officials sent them several kilometers west to an industrial town called Zwittau (Svitavy) which was to become their home for nearly seven months.

The Nazi war machine was not interested in Alek Tamsalu's talents or philosophies. He and his family were merely three units of manpower. On arrival at Zwittau, they were ushered into primitive barracks, the worst accommodation yet endured, and six days later, on October 16th, they were put on shifts at Gerätebau "Bismarck", a steel factory. Not since his school days had Tamsalu done common labour, however, there was no choice but to adjust. The women were set to work on lighter machinery, or hand-filing steel parts. Aleksander was assigned to operate a metal lathe. All worked under tight security and supervision. They were never told what they were making but the suspicion crystalized that they were tooling airplane parts.

As winter approached, the refugee workers complained so bitterly about their overcrowded and frigid housing that the factory administration finally had to move them into the cellar of an inn. This was hardly an improvement. Forty people were jammed into a single room which was so clammy that the stone walls were covered with mould. There was no place to dry clothing. The washrooms were flooded with seepage; one had to wear rubber boots to use the facilities. There was no hot water. What little heat there was came from a small wood burner. To keep warm after work and on free days, the Tamsalus practically lived in a nearby sauna.

Horrid as this year had been, the worst of 1944 was yet to come. Julia, because of her fragile constitution, could not handle the physical and mental suffering. She became ill in December and required surgery. A week after the operation, and three days before Christmas, she suffered a fatal stroke. Unable, because of his religion, to implore cooperation from local Roman Catholic authorities, Tamsalu had to draw upon his credentials as a Greek-Orthodox priest's assistant to perform his wife's funeral service alone.

Following Julia's death, there was nothing Tamsalu wanted more than to leave Zwittau. He had acquaintances in the city of Karlsbad, in western Sudetenland, and he planned to go there if only he could get permission. But the factory administration would not release him from his duties. The only relief from the tribulation at Zwittau was that warmer accommodation was finally provided.

Early in the new year, the Russian front began to close in on Sudetenland. In the minds of Alek and Aino, depression was quickly replaced by a renewed fear of impending danger. Not until May 5, when the Russians were only 30 kilometers from Zwittau did the steel works finally provide a certificate of release. Together, the two refugees ran from the factory to the railway station; but rail transit had stopped. Knowing full well that they could not outrun Russian tanks on foot, they were contemplating their fate on the way back to the barracks when they stumbled upon a German army truck being boarded by soldiers who had abandoned the fight and were fleeing west. Tamsalu bribed the men with the Estonian vodka he had been saving. The ploy worked. Within the hour, he and Aino had gathered their luggage and were aboard the truck headed northwest, avoiding the Czech border, toward the Riesen mountain range and the city of Aussig (Ústí).

After picking up more passengers at Aussig, the truck continued southwest toward Karlsbad and the German border. Now there were streams of refugees along the roadsides, most of them on foot, all of them moving west. Along the Aussig - Karlsbad road, they met the first American troops. The soldiers directed the refugees into a roadside camp where their I.D. papers were examined. Tamsalu had a passport which had been

issued during Estonian independence. This was what he showed the Americans. He feared that if he presented papers issued by the Russians, he would be placed in Russian hands.

Staying close to the truck crew, Alek and Aino remained at the camp for a few days, sleeping on the ground with borrowed blankets. Then they moved on to a second camp, and then a third, skirting the American front and approaching closer to the German border. At the third camp, someone stole the reserve gasoline out of the truck. The driver decided that the only way to economize on what was left was to have the passengers walk to reduce the load. Plodding along on foot, they eventually reached a little village where Tamsalu had a disagreement with the driver. It was the middle of the night and the driver had decided to rest until morning. Tamsalu wanted to press onward. He had noted red flags flying everywhere, and red ribbons in the lapels of the local citizens. The Russians were expected in the village the following day. With gasoline almost impossible to find, Tamsalu wanted to use what little reserve they had left to immediately put more distance between themselves and the Russian front. The driver could not be exhorted to move on. So, wasting no further time in debate, Tamsalu and his daughter snatched from the truck a few possessions they could easily carry, and they disappeared into the night.

After having struck out on their own, the Tamsalus suffered further hardships on encountering a barricade point set up by a horde of armed Czech nationals. Ostensibly these self-appointed guards were examining the refugees' possessions for military and security reasons. In reality they were confiscating whatever property appealed to them. In the search, Tamsalu lost almost everything he was carrying including his copy of Lippmaa's book on research methods and many of his documents. "I came out of there," he rote, "almost naked, with only my coat on my back. I didn't even have a change of clothes or a blanket...not to speak of money". Aino adroitly slipped a tiny box of keep sakes (including her mother's wedding ring and some silver spoons) into her father's coat pocket after he had been searched. Those were virtually the only valuables with which they escaped. (67)

Now having been robbed of nearly everything they owned, the only way to get food was to beg for it: an egg from one farm, a piece of bread from the next. This was no easy task for a proud man. At one farmhouse, Aleksander hung wallpaper in return for two-days' keep.

Tamsalu had a two-fold purpose in continuing toward Karlsbad. First, he wanted to search out his Karlsbad acquaintences from whom he expected to get help, or at least the solace of familiar faces. And secondly, he hoped sooner or later to meet the main body of the American armed forces. When at last they reached Karlsbad, the Tamsalus found the city heavily damaged, the result of countless air raids. They went directly to the address of Aleksander's friends only to discover a blackened bomb crater where their house had once stood. Neighbours told them that the whole family had been killed. Many times thereafter, Tamsalu had chilling memories of his futile petitions at the Zwittau steel works that he be allowed to join his friends in Karlsbad. With mixed feelings of sorrow over this tragedy and celebration in their good fortune, Alek and Aino continued their journey.

Just west of Karlsbad, the weary Tamsalus were resting by the roadside when they received the belated news that the war had ended. Overwhelmed with relief they pressed onward to the city of Eger (Cheb) where they at last came in contact with the American front. The U.S. forces had control of the northwest bank of the Eger River, so the bridge at Eger was, in essence, Tamsalu's gateway to freedom. But the Americans would not let him cross. He had arrived on May 14, 1945, but the boundaries of the various occupied zones had been officially closed to refugee movement for four days.

Panic-stricken in the belief that the Soviet web would now snare them from the east, they went back to the bridge three different times in agitated attempts to explain their plight. Tamsalu spoke no English and his German was scarcely passable but Aino knew enough high school English to make herself understood. Argument was pointless. They were told there could be no exceptions.

Exasperated, Tamsalu and his daughter finally left Eger and followed the river course to the southwest in the hope of finding another crossing point. Not far away from the city they came upon a farm which was being run by a German woman whose husband had disappeared during the course of the war. When they explained their situation to the woman, she was filled with sympathy and offered to guide them to a point upstream where the river was shallow enough to be forded. For her kindness, Tamsalu gave her one of the last remaining silver spoons. Early next morning, while it was still dark, the two refugees were taken to the appointed place where they waded across the river and slipped into the American zone unnoticed by the army patrols. The escape was not nearly as exceptional as it seemed to them at the time. Unknown to Tamsalu there was, in fact, constant unauthorized movement across zonal barriers. But since he believed that his very life depended on getting out of the Russian zone, he had great cause for rejoicing.

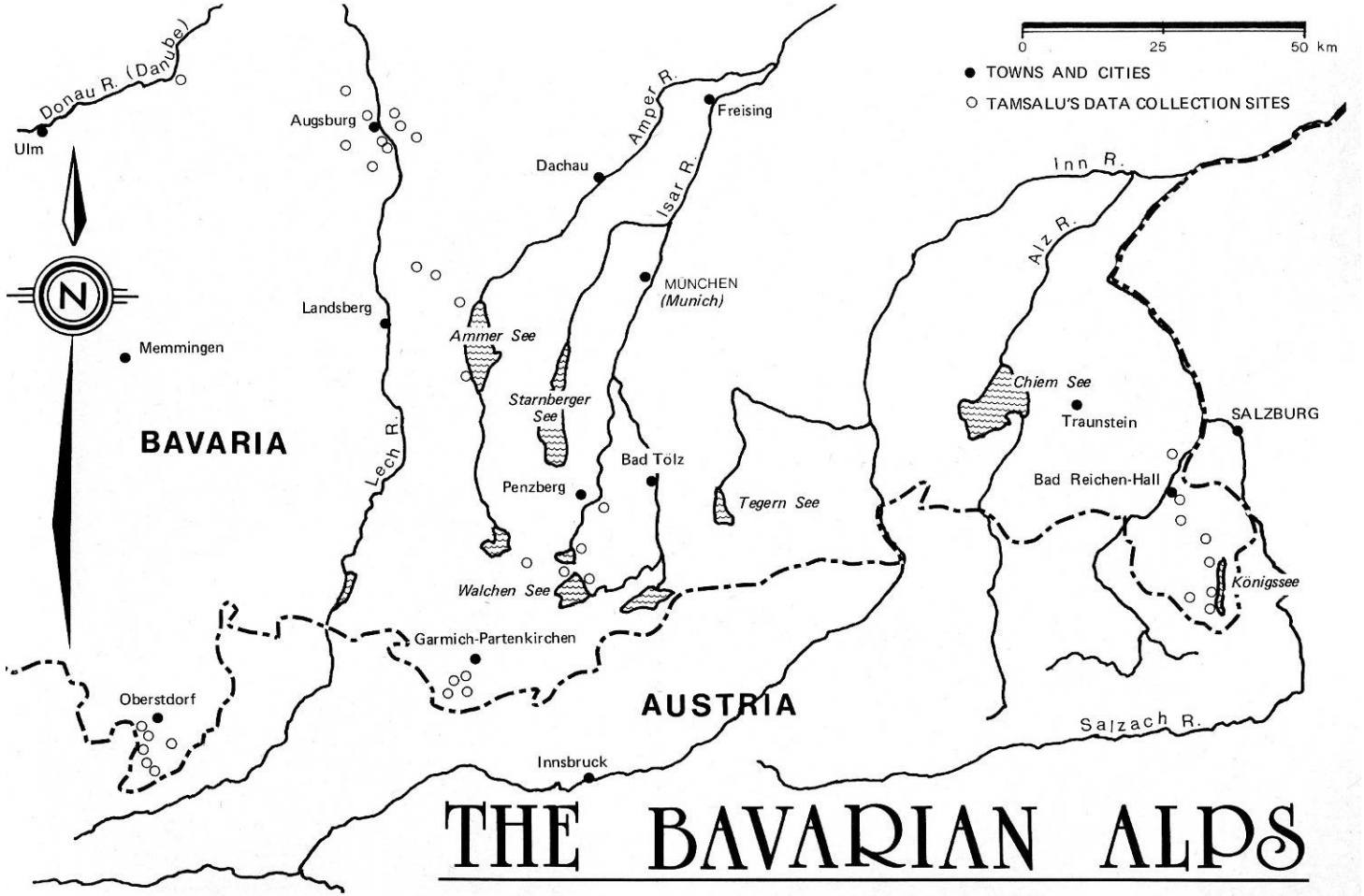
Now they turned north and wandered for several days. They gradually adopted the idea of heading to Schleswig-Holstein and beyond to Sweden. Should they reach Sweden, they intended to find out what had happened to son George. Furthermore, they could be poised to go home to Karjasmaa as soon as the western allies ordered the Russians to return Estonia to her pre-war status as a free republic.

As they continued bearing north, they learned of a transit camp near the city of Jena where a large group of Estonians was staying. The trek ended at the Jena camp on the last day of May, 1945. The Tamsalus had been on the road for nearly a month. For most of that time they had been without shelter. They had journeyed over 500 kilometers from Zwittau, and but for a few documents and keepsakes, they had lost everything they owned. Yet in the final analysis there were two things Alek Tamsalu still held firmly: one was his indelible knowledge; the other, his "Estonian tenacity", his favourite euphemism for stubborness.

The Tamsalus lived at Jena for most of the month of June. During that time Aleksander made clear to the military government that, for political reasons, neither he nor his daughter could return to Estonia under Soviet occupation. Political reaction was a commonly cited problem among the refugees. Without any controversy, he was classified as a "voluntary non-repatriable", and, in conformity with U.S. policy, was not made to return.

Anxious to get back to the academic sphere, Tamsalu visited the University of Jena and announced with a flourish that he was Aleksander Tomson, Theodor Lippmaa's coworker. Of course, no one recognized him by appearance but some of the botany faculty knew of his association with Lippmaa because of his articles in the Estonian journals. There was evidently some initial discussion of his joining the faculty, but that possibility was cut short abruptly when a rumour began to circulate that Jena was in that part of Germany which was to come under Soviet administration. He and Aino were celebrating the Estonian mid-summer festival on June 24 when they were told they were to be transferred the next day to D.P. Camp Hochfeld at Augsburg, Bavaria. There they could stay until their resettlement was planned. Tamsalu had no long-term misgivings about leaving for Jena was indeed destined to become part of the Soviet orbit. (79)

Camp Hochfeld, set up for people from the Baltic States, was not a camp in the conventional sense. It actually comprised a survey of houses built under the supervision of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Ulm
Augsburg
Landsberg
Memmingen
BAVARIA
Lech R.
Oberstdorf
Garmich-Partenkirchen
Dachau
Amper R.
Freising
Isar R.
MÜNCHEN
(Munich)
Ammer See
Starnberger See
Penzberg
Bad Tölz
Walchen See
Tegern See
AUSTRIA
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Inn R.
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Traunstein
SALZBURG
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TOWNS AND CITIES
TAMSALU'S DATA COLLECTION SITES
THE BAVARIAN ALPS

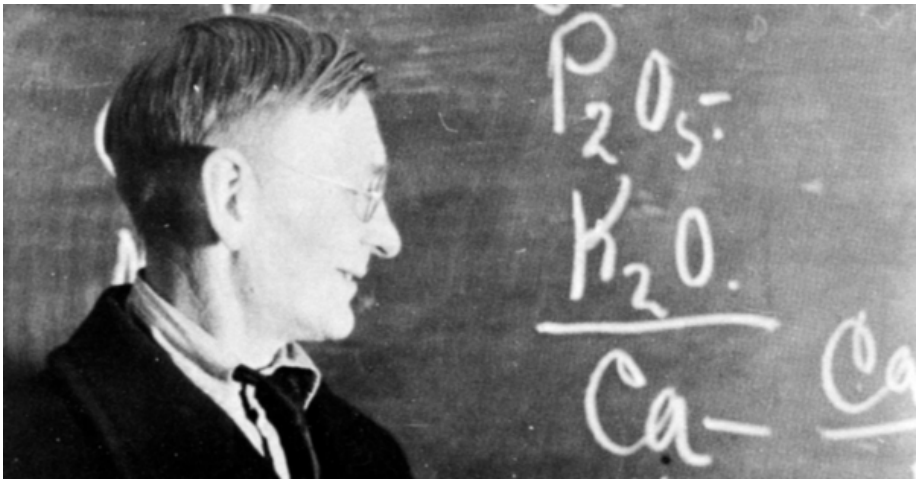
the nearby Messerschmidt factory for the factory workers. The rooms were small and each family was given only one room. Yet after what they had been through, one private room was something of a luxury for Tamsalu and his daughter. The Russian Red Cross provided food for the first two weeks of their stay after which time the American branch of the United Nations Relief and Rehabilitation Administration assumed that duty.

The refugees were not required to work for the Americans, but those who committed themselves were given double rations as payment. Tamsalu needed no such instigation. He was eager to begin rebuilding his life. He was put to work as a woodcutter supplying fuel for the camp and building structures for the U.S. army. Perhaps by virtue of his experience as an inspector of fuels in Estonia, Tamsalu was made foreman of the 160-man woodcutting crew before the end of that winter.

With a vitality that recalled his student days in Petrograd, he became involved in every new kind of activity that presented itself. Perhaps anticipating his future, he began to take English lessons at Augsburg, while Aino commuted daily to the University of Munich. When he wasn't studying or working, he made some preliminary excursions into the countryside, especially south toward the alpine towns of Garmish-Partenkirchen. Tamsalu was disturbed that he had done no hard scientific research for so long, and he knew that he needed an immediate return to field work if he were going to retrieve the previous good form of his research practice.

That first winter, he frequented the Augsburg library and withdrew armloads of books on the vegetation of the Alps. He copied or summarized long sections of pertinent material by hand, including glossaries of German technical terms. His quest for information even took him to the central library in Munich where he found a copy of Lippmaa's book on research methods (from which he copied salient points), and to the library of the Bavarian Botanical Society, also in Munich, where he persuaded someone in authority to part with an extra copy of *Sõrve taimkate*, his longest journal article.

The Estonians in general were eager to resume the normal operation of their scientific and cultural associations, and there were enough colleagues at Augsburg to do so. Numerous societies and federations emerged. Within that climate, Tamsalu and four other



Tamsalu lecturing on soil chemistry at "Eesti Rahvaulikool" (the Estonian Peoples' University), Augsburg, Germany. Spring, 1946.

Estonian educators conceived the voluntary undertaking of setting up a college at Augsburg which would provide, in the Estonian language, post-secondary level instruction. Accreditation was not important. The transfer of knowledge was. The new institution was christened *Eesti Rahvaulikool*, the "Estonian Peoples' University", and Tamsalu assumed the post of "Manager and Lecturer" in "horticultural, agricultural and botanical principles". Starting in April, 1946, he conducted weekend and evening lectures for a three-month semester that ended on June 30. (126)

Apart from whatever benefit his students received from his talks, the only surviving remnant of the time he spent lecturing was a single paper he wrote shortly after the semester. The paper, which summarized some of his lecture notes on the post-glacial development of vegetation in northern Europe, was initially accepted for publication in *Pharmacia*, a journal resurrected by displaced members of the Estonian Pharmaceutical Association. Unfortunately, however, a sudden change in the value of the German currency greatly increased publication costs. Those journals that remained solvent had to cut back the amount of material printed. Because of those increased costs, Tamsalu's seven-page article had to be rejected. It was returned to him and he filed it away, not to think of it again for several years. (29)

Tamsalu resigned his voluntary lecturing post at the end of June because outdoor research was once again beckoning. Since the previous year, he had been planning an exhaustive study of the important cosmopolitan forage grass called Red Fescue (*Festuca rubra*). (He had retained a special interest in this grass species ever since his 1930-33 Sandla Paddocks experiment had revealed how well it responded to top treatment.) Working out of Augsburg he had a splendid opportunity to compare communities of this grass in widely varying habitats from lakeshores, riverbanks and pastures at lower elevations, up to the high alpine meadows.

Having collected around Augsburg since May, he now took two week's leave from his wood-cutting activities to study in the mountains and valleys surrounding Garmish-Partenkirchen. Then in August he took another week, first exploring the banks of the Danube northeast of Ulm, then returning to Garmish to resume his work there. By the end of summer, he had made 276 analyses and had collected, identified and mounted many voucher specimens.

There is no question that field work was a time-consuming diversion from Tamsalu's camp duties. But reporting to military officers and working in an atmosphere of regimental discipline more-or-less forced Tamsalu to produce results at camp. The requirements of order and punctuality were not unlike the demands he had worked under as a student, and as Lippmaa's assistant. Thus he functioned well. As a result, in November, 1946, he was given more responsibility, this time as "Liaison Official" between the Baltic Labour Office and the woodcutters. Only two months later he was appointed "Inspector of Works" and was placed directly in charge of all refugee workers outside Camp Hochfeld. Over 400 men and women, including those working in German businesses and industries, came under his charge.

After Christmas, 1946, Aino was no longer willing to cope with her heavy commuting schedule. She moved to Munich to be near the university while her father remained behind at Hochfeld in what had become less a living quarters than a "live-in" laboratory.

He returned to field work with the advent of the alpine spring. From late May until mid-June, 1947, when the flora of the lower altitudes had come into bloom, he made some short collecting trips immediately around Augsburg. Then, on June 26, he was issued a certificate giving him free access to all U.S. occupied zones in the Alps - in pursuit of his studies - and he set his sights on more distant goals.

Within days of acquiring the certificate, Tamsalu was on his way to the vicinity of Salsburg to study the mountain vegetation of Berchtesgaden, St. Bartoloma, and the shores of the Konigssee. He seems to have found the area neither unique nor particularly interesting. Nor did he find any new types of the *Festuca rubra* communities he was still seeking. Although he was normally capable of performing up to 20 plant communities analyses per day, he did only 18 in six days, while collecting fewer than three dozen plant specimens. Furthermore, he never cited any of the Salzburg data in his manuscripts, and he was never inspired to return to that part of the Alps. But for the beautiful scenery, the trip was a disappointment.

Just the reverse was true when he spent the remainder of his leave at Oberstdorf, an alpine town southwest of Augsburg toward the Swiss border. Oberstdorf is located in a broad valley ringed by mountain peaks. He at first spent only three days there before returning to Hochfeld, but he came back for another week toward the end of July.

The Oberstdorf mountains were found to be unlike the limestone crags around Garmish, which mostly comprised barren rock faces above timber line, with only limited areas of meadow. In Oberstdorf, alpine meadows were extensive, sometimes covering entire mountain slopes. The area fascinated Tamsalu. In his two visits to the region he did more than 100 analyses. His main concern continued to be the *Festuca rubra* communities, particularly their changes in composition at higher elevations. The data was eventually to be compared with data from the communities analyzed at Garmish.

Another interest was the small alpine dairy farms. As a former agronomist he made a point of visiting several farms to see the traditional Swiss cheese making process in operation, and to examine the vegetation of the alpine meadows where livestock was pastured.

For some unknown reason, Tamsalu's 1947 research ended with his second Oberstdorf trip. Perhaps there were other diversions; perhaps the responsibilities at camp pressed too heavily. But from July 30, he collected no more specimens that year, and he stopped borrowing books from the Augsburg library.

Even in late 1947, Tamsalu, like thousands of other refugees, had no solid prospects for resettlement. Receiving countries had limited quotas and demanded prerequisite guarantees of work or sponsorship. Foreboding rumours filtered back to the resettlement camps that displaced persons were not being well received among the populations of some countries, in spite of official acceptance by their respective governments. Persistent feedback of that type inevitably stifled enthusiasm. Yet what made the passage of days unbearable was the knowledge that life at Augsburg was a limbo between a future that could not be ascertained, and a past that could never be retrieved. Political events had made clear that the Tamsalus would never return to Estonia.

Resigned to that fact, and no longer willing to be buffeted by vicissitudes, Aino began to look for any opportunity to begin determining her own future. Early in the spring of 1948, she learned that the Canadian government would be allowing the immigration of a limited number of single young women to work as domestic helpers. Back in her high school days, long before she could ever have imagined she would immigrate there, Aino had studied Canada in her geography classes. It had struck her that parts of that nation were quite like Estonia in such qualities as climate, topography and lifestyle. She decided on the move to Canada with little trepidation.

Before leaving Germany, Aino agreed with her father that as soon as she arrived in North America she would try to find him a sponsor, so that he could eventually join her there.

The ship that was to take Aino to Canada was to sail from the Italian port of Genoa. As it turned out, not even her departure from Europe would go smoothly. On March 11, 1948, she left Munich bound for Genoa, but it was not until late April, after a series of delays and setbacks, that she finally boarded ship. On May 2, Aino arrived in Canada at Halifax, Nova Scotia, and was sent by train to the city of Hamilton, Ontario. There, she began work as a maid in a private residence.

Within a year of her arrival in Hamilton, Aino became acquainted with the fledgling Royal Botanical Gardens. The Royal Botanical Gardens, occupying nearly 850 hectares on the western boundary of the city, was still very much a rudiment of its future development. Since by 1949 the Gardens had only been in full operation for three years, Aino perceived a future need for staff members, and immediately drew a connection with her father's aspirations. However, she believed it would take some time for a new arrival to work her way into those social circles from which she could make appropriate contacts on her father's behalf. Relegating those possibilities to the future, she began to search among fellow Estonians for a sponsor for her father.

Meanwhile, in Germany, Tamsalu had received another promotion, this time to salaried employment. On April 20, 1948, he was taken onto the staff of the local Resettlement Centre #5, the controlling body at Hochfeld, under the direct supervision of Base Administrator Fred Hardonk. (When the International Refugee Organization was activated in August of the same year, Resettlement Centre #5 came under its jurisdiction). Over the course of 16 months, Tamsalu earned a steady salary at a number of loosely connected occupations. His official position was that of foreman of the camp gardening crew of some 20 workers, but in relation to that work he spent considerable spare time voluntarily designing a landscaping scheme for the camp. In his writing, he didn't elaborate much on the plan. He merely noted that because his hands had become unsteady, someone else on staff had had to redraw his original map. He never mentioned that his plan was implemented and this strongly suggests that it wasn't. He usually drew attention to his successes. If this scheme followed his usual pattern, it was likely too elaborate and expensive to be of much practical use under the restrictions of the day.

Beyond his gardening and landscaping, Tamsalu also led the work crew responsible for transporting potatoes to the camp. In addition, for several months he worked as "Property Control Agent" or quartermaster in the headquarters supply office.

Needless to say, salaried work kept Tamsalu a good deal busier than the volunteer work he had done on first coming to Augsburg. His independent research ventures suffered accordingly. During the summer of 1948, he made only occasional weekend and after-work excursions in and around Hochfeld. Furthermore, there were only two weeks of leave that summer: one in early July, the other in early September. Both times he returned to Garmish-Partenkirchen, the second time to do a complete survey of the vegetation of the Reintal Valley in the Wetterstein Mountains. During those few days in September, he completed over 100 analyses, more than half his output for the whole year. This paramount effort marked the end of his research in Germany. By the following summer, he was too caught up in preparing for his emigration to spend any further time in the field.

Since she had left Germany, Aino had written regularly to her father. Her letters from the New World piqued his curiosity and heightened his anticipation of the day when he, too, would emigrate. He began reading voraciously and asking questions of the American soldiers. He massed a great deal of information. Eager to share it, he prepared a series of lectures for the camp residents on the various countries that were accepting refugees. The lectures were numerous. He did 15 on the U.S.A. alone. One presumes they were a success since the U.S. Consul, who evidently attended one of the talks, was said to have referred to them as a "great service to my country". (126)

The town of Garmisch, Germany, with the Alpspitze (mountain) in background to the left. Circa 1946. Photo: H. Huber.

Kreuzeckhaus overlooking the Reintal Valley with the Alpspitze, part of the Wetterstein Mountain chain, in the background to the left.

By July of 1949, Alek Tamsalu's immigration plans materialized. Through the National Lutheran Council, Aino had contacted an Estonian woman in the U.S., specifically in Milford, Connecticut, who was willing to act as his sponsor. When Aino sent him the news, Tamsalu was ready to leave without hesitation. One can always question, in retrospect, whether Tamsalu would have been better off to stay in Europe where his European

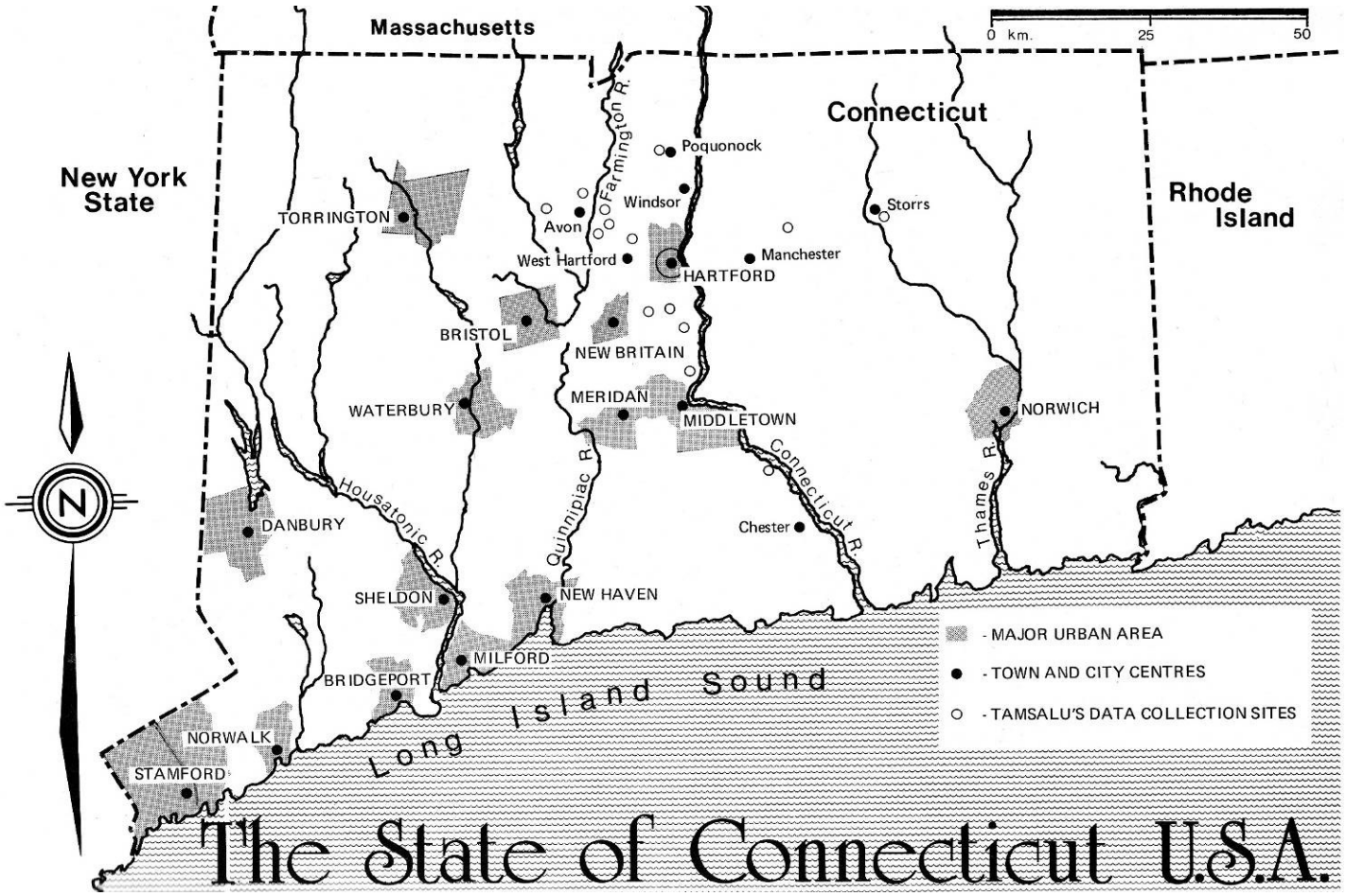
botanical training was considered the norm, and where the name of Theodor Lippmaa was well known. In the final analysis, though, Tamsalu had three reasons for leaving which seemed sound at the time. First, he had no immediate prospects for permanent work in Europe, whereas his American sponsor was supposed to provide shelter and a job. Second, he had had only good experiences among the Americans in Germany, and his American colleagues, in the post-war spirit of victory, no doubt plied him with propaganda about "the land of the free and the home of the brave". But most important, Aino was in Canada and he wished to be near her. Years of shared suffering had galvanized their relationship. "We are more than father and daughter", he would often say. "We are friends".

Tamsalu finished work at the I.R.O. Resettlement Centre on August 1, 1949. Hardonk, his employer, gave him a flattering letter of personal recommendation describing him as intelligent, knowledgeable, hard-working and honest. He had already received some educational documents from the Estonian Committee at Hochfeld, reconstructed from the testimony of eyewitnesses.

All of Tamsalu's material possessions: papers, notebooks, specimens, clothing and a few books he had acquired, fit into a single trunk and a leather briefcase with room to spare. With luggage in tow he set out for the North Sea port of Bremerhaven, anxious to embark for the country he had described in his lectures as "the land of opportunity".

Tamsalu had lived for nearly four years in the Bavarian Alps. What had he gained? For one thing his workload, and the summers of mountain hiking, had brought him into peak physical condition. He felt strong and healthy. Even the chronic stomach condition which had begun in the late 1930s no longer bothered him. Too, he had gained the respect of those with whom he had worked. But most important to him, he had revived and sharpened his techniques as a researcher and felt himself to be in good form. In three summers he had spent between 1100 and 1200 hours in the field. His notebooks contained 701 analyses and he carried with him 380 herbarium specimens. He had enough material in his notebooks for two long research papers, a fact only slightly tarnished by the realization that there might not be much interest among American scientists in the vegetation of a small segment of the Alps. That didn't matter. Now, for the first time in years, there were new horizons ahead.

Full of buoyancy and lofty expectations, Tamsalu arrived at Bremerhaven on the morning of August 14, 1949. That afternoon he, with hundreds of other European refugees, boarded the I.R.O. refugee ship *General Muir* and left Europe, never to return.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NEW BRITAIN
MERIDAN
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MIDDLETOWN
NORWICH
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Quinnipiac R.
Connecticut R.
Thames R.
DANBURY
Chester
SHELDON
NEW HAVEN
MILFORD
BRIDGEPORT
NORWALK
STAMFORD
Long Island Sound
- MAJOR URBAN AREA
- TOWN AND CITY CENTRES
- TAMSALU'S DATA COLLECTION SITES
The State of Connecticut U.S.A.

VI

LAND OF OPPORTUNITY

During the dead of night on August 23rd, Tamsalu rose for an early breakfast and went on deck to watch the sunrise and the ship's approach to New York City. For Tamsalu, the voyage had been marred by a brief but incapacitating illness followed by three and a half days of rough weather. Yet this was only a prelude to what he was about to experience in the United States. At 10:00 a.m., the *General Muir* came to dock but it was six hours before Tamsalu cleared U.S. customs. He was then placed in the hands of a Mrs. Salme Ungerson, from the local Estonian Relief Committee, who drove him to Milford, Connecticut, about 80 km northeast of New York, to the home of his American sponsor, Mrs. Asta Tennison. He remained there for more than two weeks while Mrs. Tennison secured for him his first American job.

Now he began to fully experience all the nuances and subtleties of the term "displaced person". He was alone in a vast land of unfamiliar faces where almost no one, even in the scientific community, knew anything of the Estonian Department of Agriculture, the University of Tartu, or the research work of Theodor Lippmaa. To add to his alienation, Tamsalu was plagued by a serious language problem. He possessed only the crudest command of English grammar and vocabulary which he routinely confused with the German counterparts. He spoke with a thick, unintelligible, Estonian accent, and had idiomatic problems: translating Estonian, German and Russian figures of speech directly into English, with awkward results at best. Nevertheless, he had enough unbridled optimism to believe that his talents would soon bring him recognition, and that he would have little trouble finding a research position with a university or experiment station. But fortune, which had seemed to favour him in his youth, had turned against him in middle age. Although a job was secured for Tamsalu, he had apparently not been given any remote idea of the kind of work he could expect. Mrs. Tennison instructed him to report to Charles A. Brenn, the owner and director of Chesterfield's Convalescent Home, a nursing home at Chester, Connecticut. When he arrived there, he found the location pleasant enough. Chester is a small residential town nestled among the scenic, green, mountain slopes of the southern part of the state. Tamsalu found Chesterfield's Home only a few hundred yards south of the cluster of small shops that marked the town centre. The home was on a steep hill set well back from the road. The site was secluded and, except for a parking lot at the rear, the main building was similar to the other old, white-frame houses in town.

Mellowed by age and experience, Tamsalu had learned to be mild mannered and even tactful in his personal encounters, in spite of his usually overpowering feelings and opinions. So when Brenn informed him that he was to work at unskilled labour he probably accepted the news with a polite nod of the head and click of the heels. But privately he was incensed. He thought of the many hours he had spent promoting the U.S. as a land of opportunity to other Baltic refugees.

Chesterfield's Convalescent Home, Chester, Connecticut, where Tamsalu worked through the winter of 1949-50.

On September 10, 1949, he began work. It proved a worse experience than he could ever have imagined. If Tamsalu's accusations are truthful, and there is no reason to doubt them, Brenn treated his immigrant employee like a two-legged pack animal. For a salary of only $90.00 per month, he worked a 65-hour week tending the grounds, sweeping, clearing and making repairs. It was dull, degrading and routine work made intolerable by the fact that he was also given the menial and back-breaking tasks that could not be foisted upon the other employees. It is not even certain that he received free room and board, which was usually extended to immigrants in such situations. His mailing address does not confirm this. (126)

Also difficult to abide was the total isolation from the academic world. In the little spare time he was given he visited the surrounding woodlands. He was impressed, almost stunned, by their lushness and the diversity of unfamiliar species. "I remember my first visit to a forest here", he later wrote, "where I guess I remained staring with such a foolish face that every onlooker would have laughed ... Only the occasional species was familiar". Tamsalu visited the tiny local library, but there were no botanical manuals in the stacks - only a few illustrated wildflower guides. Until the onset of winter he studied these to learn about the local plants. But the key was time. There was very little of it. With the onset of colder weather, he used his evenings to work on a manuscript about the vegetation of the Reintal Valley based on the material he had collected in the Wetterstein Mountains in 1948. (63)

Tamsalu was never able to adjust to the American way of life. His first Christmas in the U.S. was a dismal experience. He regarded that day with considerable reverence and was accustomed to taking part in the usual family customs and church. Suddenly, he found himself caught in a mad-house of "business brainwashing" (his term) characterized by distasteful and insulting radio commercials. To him this was sacrilege and he was genuinely tormented by it. Brenn did not help matters. Tamsalu was mentally preparing to enjoy his Christmas Eve in spite of the commercialism when, at 4:00 p.m., eight truckloads of gravel were dumped in the parking lot. As Tamsalu watched others going off to evening church services, he remained in the cold and darkness until 11:00 p.m. spreading the gravel so the lot would be ready for Christmas Day visitors. To cap the festive season, he injured himself on Boxing Day while hauling rocks. The injury was serious enough to keep him off work part of the week. (82)

For a man who had been in research and white collar work most of his life, the situation at Chester was a trial. The majority of his compatriots who were placed in similar jobs, quit in disgust after a week or two of such treatment. Demonstrating uncommon and perhaps inappropriate willpower, Tamsalu lasted for seven months at Chesterfield's Home. He had little to show for the time spent there - with one exception. On January 20, 1950, he completed the 41-page manuscript on the Reintal Valley which he had been writing in the Estonian language. It was significant for it was his first written work after five years of literary silence. Yet it was done only for his own satisfaction. With no publication vehicle at hand, the manuscript was simply filed away. (20)

Brenn made a demand at the beginning of April which finally broke Tamsalu's patience. Tamsalu was ordered to clean out a septic tank, apparently without proper equipment. This was a task another employee had expected extra payment to do. "That is too much," Tamsalu announced. "I am not an animal or a slave". With that declaration he went off to Middletown to register with the Connecticut State Employment Service. (82)

That same month, he drew up job applications for work at the Smithsonian Institute in Washington, and the U.S. Department of Agriculture at Beltsville, Md. Someone at Chesterfield's edited and typed them for him. He mailed the applications with several other documents. These were impressive packages but shortly after sending them he was offered a position as a "florist" at Whiting Greenhouses in West Hartford. Anxious to leave the little town of Chester, and resigned to the reality of his situation, he accepted the work without awaiting replies. It was just as well that he did, for about a month later his applications were returned with politely worded letters of rejection, the first of many he was to receive from American scientific and educational institutions. The U.S.D.A. pointed out that he was not a U.S. citizen and was, therefore, not eligible for a government research position.

Tamsalu left Chester and moved his few belongings into a brick tenement on High Street in Hartford, unfortunately several miles by public transit from his new job He began work at Whiting Greenhouses on the last Monday of April and was disgruntled to learn that, besides repotting plants, a great portion of his time was to be consumed in pushing wheelbarrow loads of soil. At least the pay was better, his fellow workers were congenial and, including Saturday mornings, he worked only 50 hours a week Years later his supervisor and the business owner, Eric Peterson, described Tamsalu in the following way:

> *"He was a brilliant man, conscientious, hard-working. I liked him. But he wasn't happy here. He really belonged in experimental work, not in a greenhouse. But of course we didn't have anything like that to offer him ... I know he used to go off into the woods at every opportunity, Saturday afternoons, Sundays, holidays - to do research. He was a busy man." (121)*

Tamsalu working at Whiting Greenhouses, West Hartford, Connecticut, June, 1953. He titled this photo "Estonian Scholar in America".

Tamsalu was as perplexed as he was busy. He was unable to comprehend why the lack of American citizenship should prevent him from being hired to a government institution in view of the fact that his knowledge of European developments in plant sociology was a rare commodity on this continent. No one else in the U.S., with the exception of Dr. Stanley Cain of the Cranbrook Institute in Michigan, was familiar enough with Lippmaa's theory and methods to be able to use them in the field. And no one else on the continent had worked with Lippmaa.

By now Tamsalu had become convinced that the only way he could attract the attention of American institutions was to undertake a solid piece of botanical research and present the results at large. In this way he hoped not only to display his prowess as a researcher, but also to indicate the practical value and future possibilities of such research. If no jobs were available, perhaps a special position could be opened for him. The studies would also help to keep his vegetation analysis methods intact as his research in the Alps once had.

From early June, his Sundays were spent travelling by bus to nearby towns and collecting and studying in the wood lots along the bus routes. By July, all of his efforts were concentrated on Keney Park, a large municipal park not too distant from his daily activities. He was, in fact, so near the park that he could even spend an hour or two studying there on week-days during the long summer evenings. Since he was still learning the various species and since time was short, he did not bother to try to identify plant specimens in the field. When he did his analyses, he identified each species by code-numbering a specimen. Later, at home, he pored over the manuals he had borrowed from the Hartford Library, keying specimens often beyond midnight.

Until he had saved money to buy his own copies, Tamsalu used library books exclusively. His main reference was an old edition of Britton and Brown's Illustrated Flora, but many other manuals and texts were used for clarification of certain points.

He noted wryly that he was the only patron of Hartford Library who had ever signed out the English translation of Braun-Blanquet's *Pflanzensoziologie*. (42, 41)

By mid-October, Tamsalu had collected "much material" from Keney Park. That winter he began writing a paper entitled *The Vegetation of Keney Park*, but although he claimed to have completed the work the following September, no copy of it has ever been located. (65, 21)

The only other notable event of the summer of 1950 was a July visit to the University of Connecticut Experimental Station at Storrs. Tamsalu was interested to see experimental plots where various top treatments were being tested on native grasses, and where pasture succession was being studied. The visit evoked memories of Saaremaa, but there were no research positions to be had.

One reason the Keney Park manuscript took so long to complete was that by the winter of 1950-51, Tamsalu was directing most of his attention to the planning of an ambitious new project which he originally christened *The Vegetation of Connecticut Forest Types*. Its purpose was to lay the foundation for future phytosociological studies by delineating the main forest types. It was to be purely an orientation work. Later a more detailed approach would be taken, hopefully when he had government-financed time and assistance. In conjunction with his planning, Tamsalu began some extensive background reading on American silviculture, forest soils, native trees, physical geography and geology. He also studied checklists of the Connecticut flora. Meanwhile he took night school English classes in Hartford. The following spring he delved into field work once again.

Tamsalu was handicapped by his reliance on public transit. He never owned a car or even a driver's license. He said that the "pushing and shoving" of city traffic made him too nervous. So because of the travelling time involved he could not make efficient use of his weekday evenings for collecting data. Weekends and holidays provided the only opportunities for study. Due to the congestion of small towns around Hartford, travel by bus was comparatively slow. He, therefore, was unable to travel outside a 30 km radius of the city and expect to do much field work on the same day.

He began to collect information in mid-May, 1951, from around the outskirts of Hartford. Talcott Mountain, the banks of the Farmington River, and Bolton Notch were explored on four consecutive weekends. He interrupted the forest studies on the June 10th weekend to revisit the Experimental Station at Storrs, where he consulted with Dr. B.A. Brown and made about 50 analyses of the top treatment plots for inclusion in his paper on *Festuca rubra*. The following weekend he travelled to Amherst, Massachusetts to attend a conference of Estonian agronomists organized by Dr. Elmar Jarvesoo, an acquaintance from his last years in Pärnu. It was the first such affair he had attended in America.

Early in 1951, Tamsalu established close ties with another acquaintance from Estonia: Dr. Elmar Leppik. Leppik, a plant pathologist, had joined the staff of Tartu University in 1930 and was there during the whole period when Tamsalu and Lippmaa were working together. However, Leppik's relationship with Tamsalu had been both superficial and casual - little more than an occasional greeting in the corridors. That fact did not deter Tamsalu. In his isolation, he was eager to correspond with anyone from the Tartu staff.

The Farmington River valley seen from Talcott Mountain near West Hartford, Connecticut. Photo: Talcott Mountain Science Center for Student Involvement.

Tamsalu had learned that Leppik had also immigrated from Germany to the U.S. and had taken a temporary post at Augustana College, in Sioux Falls, S.D. He wrote to Leppik in March, 1951, and found Leppik eager to take up the correspondence. For nine years, the two scientists wrote regularly and often. In their letters, Tamsalu seemed to accede, almost humbly, to Leppik's scholastic pre-eminence over him. Leppik was, by far, the younger of the two men, yet Tamsalu always addressed him with a quality of formal respect, as if he were writing to a much older man. Indeed, he could scarsely cope when Leppik suggested that they address each other in a more familiar way. Until Tamsalu's death, he and Leppik sought solace from one another during frequent hard times. (Leppik, too, was having trouble finding permanent work in his own field). They exchanged manuscripts, inviting commentary. They even echoed similar social and political views, although Tamsalu was always more vociferous in these matters maintaining a constant flow of emotional rhetoric on every subject from the evils of human nature to the injustices of government. Leppik always read with patience and usually conveyed his sober agreement. As they provided each other with emotional support, Tamsalu eventually paid Leppik a supreme compliment by telling him he had not had such a friend since Lippmaa's death.

On the matter of his field work, events were progressing so smoothly in 1951 that Tamsalu had allowed himself enough laxity to take a 10-day working vacation. He intended to visit his daughter, and also see the experiment station at the Ontario Agricultural College at Guelph, about 50 km northwest of Hamilton. He planned to leave Hartford on the Wednesday following his conference in Amherst. Though there was every reason for a sense of well-being, a substantial set-back was imminent. Shortly before he was to leave for Canada, Tamsalu was crossing Whiting Lane on his way to the greenhouses when he was struck by a speeding car. He reeled away and collapsed at the side of the road, fortunate not to have fallen under the wheels. (The car disappeared into the traffic at the next intersection.) Surprisingly, he had-suffered no broken bones, but extensive injuries to his legs temporarily crippled him. He was taken to hospital where he remained unable to walk for several days. Recuperation was tedious and painful. The tedium was intensified by the knowledge that each week spent incapacitated was a week lost for field work. What seemed to accelerate his recovery was the approach of his daughter's wedding in late July. Although he had not returned to field work by then, he made a special effort to ensure his presence at the wedding.

When he took his first trip to Canada, he had recovered enough strength in his legs to be able to walk, albeit unsteadily, with the aid of a cane. Yet he made every second of the trip count. He was able to visit the experiment station at the Ontario Agricultural College. Dr. F.H. Montgomery provided a personally guided tour and also introduced Tamsalu to Prof. O.M. McConkey. Tamsalu explained his plight to both men but there was little they could do to help him in his employment search. Apart from acquainting him with a professional contact, the trip only rekindled memories of the years he had spent at Aruküla.

In spite of the pain in his legs and his resultant tottering gait, Tamsalu chose his vacation to resume his field work. Not knowing when he would return to Canada, he wanted to inspect the white cedar swamps which he had seen around Freelton during his trip to Guelph. Unbelievably, he took an early bus to Freelton on July 27, the day of his daughter's wedding, and spent the morning performing ecological analyses! He was careful to return to Hamilton in time to give the bride away. He probably borrowed money for a wedding gift. Medical bills had erased his savings.

Tamsalu remained at Hamilton for only a few days after the wedding. During that time, he pressured himself to take more field trips in the region around Hamilton. While collecting some data for comparison with his Connecticut material, he became convinced

that he could now bear his physical adversity enough to complete the Connecticut forest study that same summer. He returned to Hartford with renewed vigour.

Far behind schedule, Tamsalu resumed his study at an accelerated pace. Now he felt compelled to make use of his Saturday afternoons. The work progressed until the last Saturday of August when yet another incident curtailed his activities. That Saturday, as usual, he worked at the greenhouses for five hours before noon, then left to spend the rest of the day collecting data. By early afternoon he had reached a promising wooded stretch along the Farmington River near Poquonock, 15 km north of Hartford. He hadn't been working for more than an hour when he was suddenly accosted by State Police officers who wanted to know what he was doing on private property, with an odd-looking case of pressed plants, and a notebook full of suspiciously foreign-sounding words like *Quercus velutina* and *Platanus occidentalis*. Unable to give a fluent account of himself, the incredulous botanist was seized by the officers, deposited in the back of their cruiser and whisked off to police headquarters at Windsor. There he was thoroughly searched and investigated for three hours before he was released with a stern reprimand about trespassing. Many people would have dismissed such an episode and carried on as before, perhaps with a little more caution. Not Tamsalu. His experiences with the Russians had left him paranoid. With this latest happening he was deeply shaken and disillusioned:

> *"In about 30 years of research practise, this is only the second time I have been captured ... The first time was in 1940 in my native Estonia, by the communists two days after they overthrew our government ... I am sorry I did not ask earlier for permission to do my research. But then everyone told me this was a free country ..." (64)*

With field work taking on a newly perceived hazard, Tamsalu's zeal was blunted. He made a few more field trips to the safer confines of public wood lots and parks to round out the data for his Connecticut Forest study. Eric Peterson even wrote a letter of introduction for him so that he could continue his botanizing unharassed by officialdom. But it found little use. By the third week of September, Tamsalu had collected as much data as he felt he needed "for a basic perspective". Although he continued to live in Connecticut for nearly two more years, his researching days in the U.S. had come to an end.

His injuries continued to bother him throughout the summer and he had not completely recovered until three full months after the hit-and-run accident. In spite of his complete recovery, the accident cast a bleak shadow over the future of his once excellent health. Emotional pressures and physical strain were taking their toll. Tobacco was the opiate. He smoked more and more heavily to ease his tensions.

As the winter of 1951-52 progressed, Tamsalu spent most of his spare time sequestered in his apartment, pounding his typewriter into a state of infirmity. Based on observation, he identified 15 distinct Connecticut forest types and outlined their composition, adding another three "temporary" community types which he believed to be affected by influences such as fire. Some of his community types concurred with those he had read about in papers on American forestry. Any disparities he observed were attributed to the commercial priorities of silvicultural forest classification.

Writing the Connecticut forests manuscript took nearly seven months of evenings and weekends. As usual much of that time was consumed in developing the analytical tables which displayed the evidence for his conclusions. Prof. Montgomery provided some helpful criticism. The manuscript, which seems to have been completed in May, contained about 22,000 words of text, which discussed 165 analyses selected from the 220 he had collected. The tables, carefully drafted in single-spaced typing, required 40 pages, some of them legal-sized. Written in a format similar to *Sõrve taimkate*, this paper was by far the longest Tamsalu ever produced. (22)

To be sure, there were weaknesses in the paper. He candidly admitted he didn't have as much basic raw data on the forest types as he would have preferred. There was also a problem that, unlike some of the European forests he had studied, the vegetation of Connecticut did not fall into conveniently discreet typical communities. He described the appearance of the plant communities as "patchy" and "atypical" in his letters, and his assessment in this respect was quite correct. The complicated and irregular appearance of communities could be attributed to marked changes in elevation and slope over short distances, varied geological background, intensive agricultural use, a history of widespread annual burnings prior to World War I, and the wide introduction of exotic flora and fauna. In spite of its weaknesses, (which reflected the nature of the communities studied), the manuscript was clearly an incisive effort. What it needed was careful editing by someone with a sound command of the English language. (71)

One day after work, still dressed in his dirty working clothes, Tamsalu took his manuscript to Hillyer College in Hartford, where, without prior appointment, he went to the office of the most logical choice for an editor he could imagine: the Dean of the Department of English, Associate Professor Merrill B. Sherman. Sherman was taken aback at the dishevelled appearance of his impromptu guest, and at first he had much difficulty understanding what Tamsalu was trying to tell him. But upon thumbing through the manuscript he realized immediately that he was in the presence of a fellow scholar. He then listened in fascination while Tamsalu reviewed his career and his reasons for undertaking the study. Moved to total sympathy, Sherman offered his services as editor. This was the beginning of a long friendship - and of considerable frustration for both men - as Sherman adopted Tamsalu's cause, essentially becoming his spokesman. After some intensive editing sessions, the manuscript was completed and retyped with eight carbon copies. It was retitled *The Types of Connecticut Woods* - a deceptively all-inclusive title since the research only covered some selected forest communities, and only in central Connecticut. A major shortcoming of the edited paper lay in the fact that Sherman knew nothing about plant sociology, and Tamsalu, not yet fully informed on correct English usage of botanical terms, could not explain the subtleties of the subject to him. So Sherman corrected the grammar but left the original semantics, and many of Tamsalu's ill-chosen words and phrases intact for fear of wrongly changing the sense of what was written. But as far as Sherman and Tamsalu could deduce, the manuscript was ready for distribution. (22)

During the winter, Tamsalu's employment search had been at a virtual standstill. Now, armed with his manuscript and the support of Professor Sherman, he began an earnest campaign. Over the course of several months, he and Sherman circulated copies to numerous agencies and to other scientists who were working in related fields. Among the recipients were: the School of Forestry at Yale, the Connecticut State Park and Forest Commission, the U.S.D.A. Forest Service, the Department of Public Parks at New Britain, Conn., the University of Connecticut, the Northeastern Forest Experiment Station at Upper Darby, Penn., and Dr. Henry Oosting, editor of Ecological Monographs at Duke University. Meanwhile, working against accumulating exhaustion, Tamsalu engaged in a barrage of letter writing. He tried, through various Estonian agencies in the U.S., to secure proof of his educational background from surviving government records. All attempts failed. In an innovative approach, he applied for university grants by which he intended to continue his studies as a post-graduate university student. That, too, was unsuccessful. Non-citizens were ineligible for grants.

The institutions which received the "Connecticut Woods" manuscript reacted as if with one voice. Despite Tamsalu's obvious research abilities, there were no job openings extant. Most of the institutions cited budgetary problems or citizenship restrictions as the reasons. The State Forest Commission added that European analysis methods had been tried and had "fallen short of our needs here in the northeast". (71)

Academically, reaction from individuals was highly favourable. Overlooking Tamsalu's use of outdated nomenclature, his lack of facility with the language and his unfamiliar format, several people were impressed with the content and scholarship of the paper. Professor Montgomery wrote: "I think that this is a very interesting piece of work, particularly in comparison with the European forests, and I wish you success in this publication". (68)

Marinus Westveld, Principal Silviculturist at the Northeastern Forest Experiment Station in Pennsylvania, was generous in his praise: "It is a meticulous piece of work. It is basic to an understanding of Connecticut forest types. I hope it will be possible for some research organization to capitalize on your excellent understanding of plant sociology". (77)

The response from Dr. Oosting was guarded but most encouraging: 'The work you have done should be published," he wrote, "but I regret that I must tell you that your manuscript is not ready for publication. It needs much revision and condensation of the text proper and, because of printing costs, no journal could afford to publish all of your tables ...

"If your paper could be published as it is, we could consider it for *Ecological Monographs*. If it is condensed, as I think it should be, it will undoubtedly be of a length suitable for consideration in *Ecology* (which accepts papers up to 20 pages long)." (70)

Oosting went on to explain the correct format for American technical writing, and also suggested that Tamsalu change the scientific names to agree with the new Eighth Edition of *Gray's Manual*. The criticisms were accepted with appreciation, but what Tamsalu really wanted was a job opportunity. There was none at Duke University. (45)

In future articles, Tamsalu used the format Oosting had recommended. And he converted immediately to using *Gray's Manual*, suggesting to his friend, Dr. Leppik, that he do the same. But as to publishing his manuscript, he had many reservations. The idea of condensing the manuscript to 20 pages was dismissed outright as absurd. So was a suggestion of dropping most of the analytical tables. Furthermore, the work initially had not been intended for publication. It was an "orientation" work, the first raw material, and Tamsalu insisted it would take at least one more year of field work and revision before publication in *Ecological Monographs* could be considered. This was an ethical but unwise decision. Publication in a prestigious American journal would have introduced his name to scientists throughout North America. Other researchers were quite satisfied with the content of the manuscript. If he had simply applied the very specific criticisms he had been given, he would have had an excellent chance of publishing. But the chances to resume this field work never came. The manuscript was never rewritten or edited and, although it played an important role in securing for Tamsalu a research post, its much greater potential ended there. To this day it remains unpublished.

By mid-summer, 1952, the avalanche of polite rejections from prospective employers had left Tamsalu in a deep depression. He wrote "I feel all these efforts are similar to Don Quixote's battle with the windmills. Here my way is marked by a wheelbarrow and it is fruitless to attempt anything else". Tamsalu's much repeated Quixote analogy says much about his conception of himself. Cervantes' hero repeatedly failed in his adventures because he presumed that common humanity was governed by ideals as exalted as he perceived his own to be. (73)

Tamsalu's chronic stomach ailment, which had been dormant for several years, began to flare up again. He attributed the attacks to his physical and mental fatigue, and his steady diet of canned food. Once again the problem subsided with medical treatment.

There was at least some respite from the ennui of daily existence. Social life was provided by the Sherman family and some fellow Estonians he had met at a Hartford church service. Also, he had been able to find much better accommodation. He was now renting a suite in a large frame home on Whiting Lane only 156 paces up the road from Whiting Greenhouses. (He measured the exact distance of course!)

Since early spring, Tamsalu had been planning to return to Canada to spend his next vacation with his daughter and son-in-law in Hamilton. The thought of immigrating to Canada had occurred to him many times if only he could find work in a research institution: any kind of work which would at least provide the spare time with which he could study the Canadian vegetation, and where he would have access to proper facilities during "off hours". His son-in-law, Walter Tera, had offered to train him as a mechanic and promised him a job in his garage business. But he had no desire to embark in an unfamiliar trade, especially since he could qualify for old age pension merely by remaining at his present job for four more years.

With the arrival of autumn and the beginning of his vacation, Tamsalu came to Canada quite unprepared for the opportunity awaiting him. Through some of her social contacts, Aino had become acquainted with Prof. Norman W. Radforth, Director of the Royal Botanical Gardens at that time; and Judge Wm. F. Schwenger, President of the Gardens' Board of Directors. Upon hearing of Tamsalu's extraordinary background and the fact that he was seeking a research post, Radforth consented to speak with him sometime during the visit.

Needless to say, Tamsalu was delighted with the prospect of an interview, but had to go empty-handed since he had left his manuscripts in Connecticut. Together, he and Radforth struggled through a dialogue on phytosociology. Tamsalu was quite impressed with Radforth and especially interested in his arctic tundra studies. Tamsalu seems to have struck Radforth as an eccentric personality - the same conclusion as was drawn by Jaak Ümarik, his first Estonian employer. It was a composite illusion magnified by his general appearance, heavy accent and quaintly formal mannerisms. However, Radforth seemed impressed with Tamsalu, the botanist. He expressed an interest in seeing a copy of *The Types of Connecticut Woods*. And although there were no research positions immediately available, Radforth suggested that some arrangement could be worked out in the near future.

Once again Tamsalu returned from his Canadian vacation in high spirits. Some weeks after his return, he sent Radforth a copy of the "Connecticut Woods "manuscript with a reminder that he would like to be informed as soon as a position became available at the Gardens. There was no reply.

Tamsalu had considered elaborating the "Connecticut Woods" manuscript during the winter and changing the scientific names as per *Gray's Manual* Eighth Edition. But instead, he spent until mid-January, 1953, completing a new manuscript *Eastern White Cedar (Thuja occidentalis L) in Hardwood* based upon the few analyses he had done during his first trip to Canada in 1951. Copies were sent to Radforth and Oosting. Then he began a final draft of *The Types of Festuca rubra Associations*, the study he had begun in Germany. It was completed in February. (23, 24)

There is no question that Tamsalu wanted to remain in the U.S. He had invested much of his resources in his forest studies, and he preferred to stay in Connecticut where he could expand upon them. In Canada he would have to begin again.

At least contented that he had an option in Canada, he continued to look for the elusive research position in the U.S. Having eliminated almost every channel, Tamsalu

and Sherman jointly contended that the last possible chance lay within the U.S. federal Civil Service. There was some urgency about this. Tamsalu was not eligible for U.S. citizenship until the autumn of 1954, but he could not wait that long. In 1953, he would have reached his 62nd birthday, and would no longer have been eligible by reason of his age. Somehow he had to circumvent the rules. Concluding that his age was a much greater

Dr. Elmar Leppik, circa 1952.

obstacle than the citizenship issue, Tamsalu was convinced that he had to be accepted by the Civil Service before his April 28th birthday. Sherman wrote directly to Congressman Thomas Dodd to enlist high-level support for Tamsalu. Dodd complied. On the advice of the Estonian consulate, Tamsalu solicited notarized letters of reference from Sherman (on his character), Leppik (on his academic background), and Westveld (on the value of the Connecticut research). All three men provided glowing recommendations. As Tamsalu pointed out in a letter of gratitude, Leppik's testimony could have stood alone in place of educational documents. Although he was taking medical treatment for a minor back injury and was suffering from a month long bout with the flu, Tamsalu filled out the Civil Service application form (four pages of fine print), adding abundant appendices on his work history and the letters of recommendation. The application was for the position of Agricultural Research Scientist. The package was in the mail by mid-March, seven weeks ahead of the deadline. (125,126)

Days passed, then weeks. It was April 7th before the Civil Service Commission even acknowledged receipt of the application. The response was noncommittal. A decision, they said, would take four to six weeks. In mid-April, Sherman wrote to Governor John Lodge to seek help. Nothing concrete materialized. Tamsalu could not fathom the reason for such a long delay. In his mind the question was not how the Civil Service could bend regulations to admit an alien, but rather how the U.S. could afford to lose a man with his unique knowledge.

Tamsalu's hopes were destroyed a week before his birthday. His application was returned. The only mark on it was a small red circle around his answer to the citizenship question. Tamsalu was at once crushed and embittered. As he wrote to Westveld, he lost a year or more of his time for his naivity and his wish to become a useful American citizen, and further, he lost his belief in the sincerity of the land that might have become his permanent home. (81)

Tamsalu dashed off a letter to Radforth asking if a position could now be opened on the staff of the Royal Botanical Gardens. Radforth held true to his promise. He replied that one position for a skilled worker would remain open until July. Tamsalu was invited to take the position and hold it until funding for his research was approved. Arrangements were made to see Radforth at the end of June while Tamsalu again vacationed in Canada.

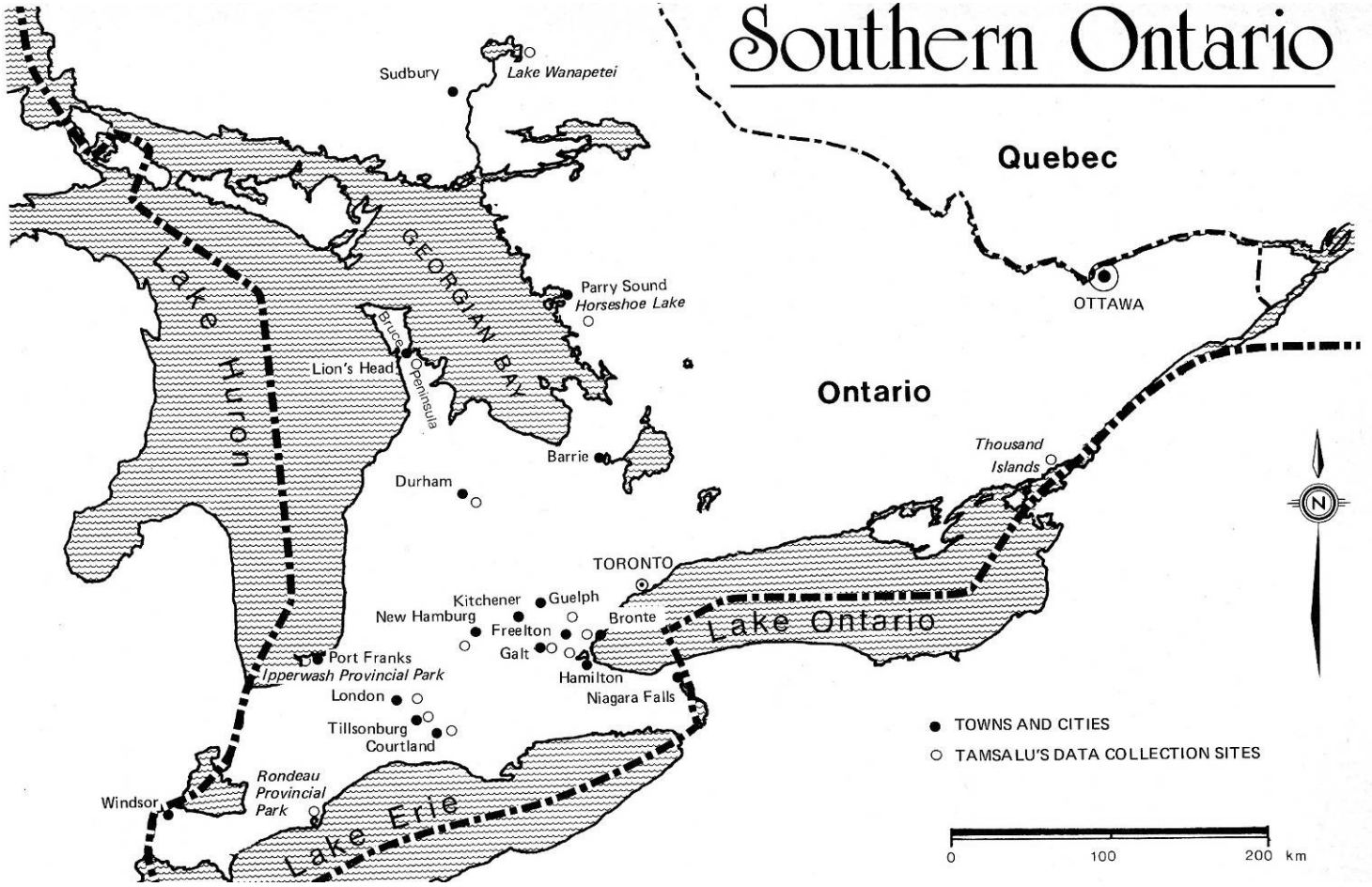
About two months before he left Connecticut, one event heavily shaded Tamsalu's opinion of American botanists. He had agreed to take part in a Saturday field trip in early June with four other botanists and foresters, including Westveld, Jerry Olson and Henry Hicock. (Olson and Hicock were staff members from the Connecticut Agricultural Experiment Station at New Haven). They had all agreed it would be profitable to spend the day comparing European and American theories and methods *in situ*. Tamsalu was initially enthused. This was his only chance to meet some of the botanists he had corresponded with, and it was a rare learning opportunity. During the day, the five men visited several wood lots, probably some of those Tamsalu had analyzed during his "Connecticut Woods" studies. Yet Tamsalu noticed, to his dismay and disillusionment, that the other men refused to wander far from the parked car. Several times he failed to entice his companions deeper into the woods with promises of more interesting and more characteristic plant communities "off the beaten track". Of course, Tamsalu drew the typically hyperbolic conclusion that this isolated instance generally represented the professional attitudes of American botanists - "those lab men in white coats who have scarcely travelled through the landscape in their cars, and who research the vegetation at 50 miles per hour ..." This was an impression that remained with him permanently. (95)

He vacationed in Canada as planned and, on June 24th, was interviewed for two hours by Radforth. Details were discussed and an agreement was reached about Tamsalu's employment. He was to be given a position as a skilled worker in the plant propagation department. The job was to be held temporarily until approval was obtained from the Board to fund Tamsalu's work as a botanist. Approval was expected the following year.

At a medical examination the next day, Tamsalu was pronounced in good health. He returned to Connecticut to await the processing of his immigration papers. Receiving his visa on August 1st, he quit work at Whiting Greenhouses the same day.

Eric Peterson was one of many who was saddened to see him leave. Peterson assured him that the door would always be open should Tamsalu wish to return to his old job.

A week later Tamsalu was in Canada where he was to remain the rest of his life. He had only two regrets. One was leaving his many friends, especially Prof. Sherman who had done so much on his behalf. The other was the fate of his work on Connecticut forests, for he knew now that he had no chance of ever finishing it.


Southern Ontario
Quebec
Ontario
Sudbury
Lake Wanapetei
Parry Sound
Horseshoe Lake
OTTAWA
GEORGIAN BAY
Lake Huron
Bruce Peninsula
Lion's Head
Barrie
Durham
Thousand Islands
TORONTO
Kitchener
Guelph
New Hamburg
Freelton
Bronte
Galt
Hamilton
Niagara Falls
Lake Ontario
Port Franks
Ipperwash Provincial Park
London
Tillsonburg
Courtland
Rondeau Provincial Park
Windsor
Lake Erie
TOWNS AND CITIES
TAMSALU'S DATA COLLECTION SITES
0
100
200 km

VII

CONTRIBUTION...AND CONFLICT

At 64 years, an age when most men are contemplating an impending retirement, Aleksander Tamsalu started his plant science career anew at the Royal Botanical Gardens. His first impression of the place was that he was not much further ahead than he had been at Whiting Greenhouses. On his first day on the job his supervisor, Jim Redman, sent him to Ray Halward at the RBG Nursery, where he was put to work doing exactly the same kind of thing he had done at Hartford. Yet within the first week of his employment, he had already examined the existing long-range plans for the Arboretum, Hendrie Park, a Japanese garden (which never materialized) and the proposed nature trails for the south shore of Cootes Paradise Sanctuary, and was mulling over the contributions he could make. Only a heavy rainstorm prevented his beginning a new plant sociology project in Cootes Paradise during his first weekend as a Canadian resident.

With his vast experience of mapping vegetation in Estonia, his plan to map the plant communities of Cootes Paradise was not unlike the scores of other projects he had undertaken during the 1930s. As in the past, he developed the idea first, to satisfy his curiosity and second, to sharpen his technique and perhaps expedite his promotion to the research job he had expected. Through the remainder of August and September, he attacked his new undertaking, collecting data and plant specimens during his weekends and evenings, while working as a nursery labourer during the week days.

At the same time, he contracted with the editors of an Estonian journal to write an article in Estonian on *U.S. Government Forests*, their history, present status and economics, from information he had already collected in the background reading for his Connecticut forest research.

Despite his every intention of completing the "Cootes Paradise" manuscript before Christmas, Tamsalu's health interfered. This was the first of a sequence of physical problems that was to plague him constantly for the rest of his life. In early November, he suffered an attack of acute appendicitis. The ensuing surgery and convalescence wasted the whole month. Yet, in spite of his feeling unsteady he forced himself to work, and by February, 1954, the study was finished. Like the "Hiiumaa" and "Saaremaa" manuscripts of many years earlier, this paper comprised a large (90x75 cm) hand-coloured map with an accompanying text. The 31-page manuscript described the marshlands, with six analytical tables, and the woodland of the south shore, in which section the analytical material was incorporated into the text rather than tabulated. The study had taken an estimated 500 hours. (25)

On February 23rd he presented his results to Dr. Radforth, with a covering letter in which he pleaded not to be relegated any longer to wasting his time in common labour, which anyone could do. He even suggested working half-time as a labourer, and half as a researcher.

Tamsalu was very concerned that since his arrival in Canada he had heard little further discussion of his future research post, but there was a further undercurrent of desperation in his petition to Radforth. Because of U.S. emigration rules, Tamsalu could not return to the U.S. and qualify for old age pension after six-months residence outside the country. That deadline had passed at the end of January. Now, if he returned to the States he would have to begin his citizenship and pension "period of residence" all over again and he would be 70 before he qualified. Furthermore, the Royal Botanical Gardens was suffering severe funding restraints to the point that many workers were being laid off until spring. With medical bills to be paid, Tamsalu knew full well he could not afford a layoff. On the other hand, his continued employment caused friction among the senior groundsmen who looked askance at the new labourer who was being protected while their jobs were in jeopardy. Also Tamsalu, because of his special skills in map-making, carpentry, painting and plant propagation which he had learned in Estonian agricultural schools, was kept inside during inclement weather to do skilled work, while the remaining senior workers were given outside jobs. Tamsalu was anxious to be rid of such an uncomfortable situation.

From his perspective, the future did not look promising. He confided in a letter to his friend, Elmar Leppik " ... If my research with RBG gives me no other profit, then I dare to hope that it will at least help me in the future to be kept employed for the whole year ... If I had known ahead that I would be coming into such a work crisis here, then I guess I wouldn't have dared to come, since my former position was very secure ... All big plans have to be thrown aside and I will try to pull myself through somehow until things improve or completely deteriorate". (82)

His "big plan" for the summer of 1954 had been grandiose indeed: no less than surveying a "cross-section of Canada's forest from the south to the Arctic". The plan had the proportions of a pipe dream for a 65-year old man with almost no Canadian experience and no private transportation, especially considering that there was no funding forthcoming even for Dr. Radforth's arctic research. Wisely he abandoned the idea and resigned himself to less ambitious goals. First, he decided to prepare a complete checklist of native plants in Cootes Paradise Sanctuary - correctly expecting to find about 800 species. Secondly, he planned to establish a native fern garden - the first in Canada -on the south shore adjacent to the Ravine Road Trail. And thirdly, if time permitted, he wanted to pursue private studies on the vegetation of southern Ontario. Having examined a map of Canadian forest types, he had become intrigued with the vegetation of the Carolinian zone and the placement of its northern boundary. But these latter studies would, he concluded, have to be deferred to his vacations.

By early April, 1954, Tamsalu was ready for another season of weekend field work. He declared that the appendix operation had been good for him, that he felt strong again, and that his digestive problems of the past had disappeared. He submitted his proposals for spare time projects to the Director. To his list of project ideas he now added the surveying and mapping of a new nature trail to extend along the south shore of Cootes Paradise from Princess Point to beyond McMaster University.

Professor Radforth had by this time resigned from the Gardens and the directorship had been passed to his understudy Leslie Laking. With the directorship, the question of Tamsalu's future research job also fell to him. Laking gave Tamsalu written clearance to collect plant specimens and survey a nature trail in his spare time on Gardens' property. As to full employment as a researcher, the 1954 budget problems rendered any such move impossible.

That summer Tamsalu worked as hard, perhaps harder, than he had worked on his Connecticut forest studies. So engrossed was he in his work that his personal correspondence fell off for the summer.

During his two weeks of vacation, research outside the Royal Botanical Gardens commanded Tamsalu's attention. In August, he spent a few days on the Bruce Peninsula, then, in September, he visited Rondeau Provincial Park. Tamsalu had read in one of his forestry books that Rondeau Provincial Park, on Lake Erie, contained the most purely typical example of Carolinian forest in southern Ontario. With his second week of vacation scheduled for the week of September 5th, Tamsalu contacted the Park Superintendent and arranged permission to analyze the Rondeau vegetation and collect herbarium specimens. He spent nine days collecting data from the field and the park library with the help of the park superintendent, R.A. McLaren, and Naturalist Dick Ussher. On returning home, he began spending his free time preparing his latest manuscript: *The Vegetation of Rondeau Provincial Park.* (30)

Ray Halward and Tamsalu (right) at the RBG nursery. April, 1954.

As 1954 drew to a close, it appeared to have been a profitable year for Tamsalu. He had completely changed and rewritten the paper on Cootes Paradise he had prepared the year before, and made his recommendations for development of that property as a nature interpretive area. He had staked out a route for the nature trail he had proposed. He had compiled a species list for the south shore of Cootes Paradise and had collected voucher specimens for 826 species. He had surveyed the Cootes Paradise and Hendrie Valley properties and divided them into 270 ecologically discrete units, delineated according to Lippmaa's methods. He had collected specimens and data from the Bruce Peninsula and Rondeau Provincial Park, and the "Rondeau" manuscript was well under way. But, perhaps equally important to him, he had published three articles in Estonian scientific journals. The *Yearbook of the Estonian Free Farmers Federation* had printed an abstract of his "*Festuca rubra*" manuscript and also the paper he had been asked to write entitled U.S. Government Forests. His other publication was the paper condensed from lectures he had given in Augsburg. It was titled: *Development of Vegetation in Northern Europe and Estonia after the Great Ice Age*. Tamsalu had sent the manuscript to a former acquaintance living in Germany, and had asked for critical appraisal. Unknown to him, the manuscript had been relayed to Stockholm to the editors of the Estonian forestry yearbook *Eesti Metsamees Exiilis*. It was not until the following February that Tamsalu learned through Elmar Leppik that his article had "wandered into print". (26.27,28,29)

Throughout the year Tamsalu had invested 800 hours in his independent research and writing, which means he did little else in 1954 than eat, sleep, and work. And as happened in Connecticut, his health suffered from mounting pressures and abuse. At the beginning of the summer he had felt quite fit, but by November he had to admit that fatigue had brought him to the verge of a physical and mental breakdown. He went for a medical examination. The doctor, disturbed at the condition to which Tamsalu had driven himself, confined him to hospital for a week of enforced rest. Once again he marshalled his energy.

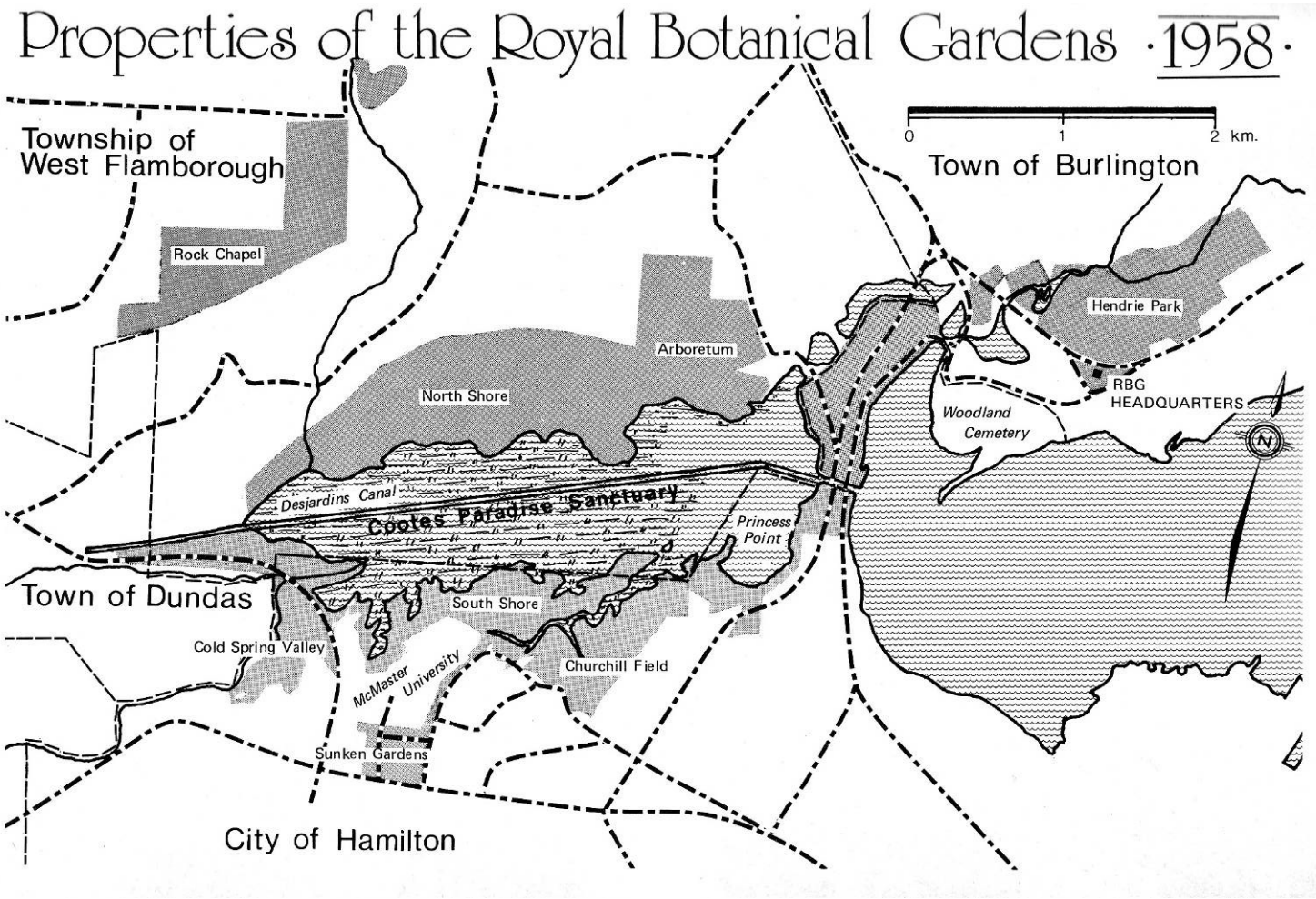
When Director Leslie Laking was presented with the mountain of data Tamsalu had collected and processed in 1954, it became patently clear to him that this man's effort was no casual hobby. He now realized that Tamsalu could not continue to collect data at this breakneck pace and also spend eight hours a day at common labour. The continued risk to his health was simply too great. Laking used the RBG research data as the needed wedge to promote Tamsalu to the full-time task of completing a floristic survey of the entire RBG property. The promotion was effective beginning the third week of January, 1955.

The Annual Report covering 1954 announced Tamsalu's contribution with a perfervid fanfare: "During the course of the year Mr. A. Tamsalu, an Estonian plant ecologist, temporarily employed .... in the propagation department, has made an intensive floristic study of the portion of the Gardens' natural areas in the environs of Cootes Paradise. His annotated list now comprises some 800 species, varieties and forms, and the collected specimens being processed will be placed in the herbarium. This comprehensive study has been accomplished privately by intensive weekend work and is being generously made available to the Gardens. Having this valuable work brought into usable form, published either as a popular handbook of native plants within the Gardens, or a scientific ecological study, or both, is not only desirable, but immediate consideration should be given to devising means of accomplishing it". (60)

Tamsalu did not even learn of the plan to revise his Cootes Paradise study into hand book format until he read the Annual Report. Of course, there was no money at hand to cover printing costs for such a project, but even if money had been available, it might have made no difference to Tamsalu. He had little time for editing or revision. His attention had already been diverted from the "Cootes Paradise" manuscript, and he had new and diverse plans for 1955. It is not surprising that by mid-summer he was complaining to Elmar Leppik that he was once more "in danger of drowning, not in water but in work". He asked rhetorically in one letter to his friend how he could possibly find the time to revise the Cootes Paradise paper, this time as a handbook. (84)

His official work as a researcher began on January 17, 1955, and from that day until the end of his career, he kept an hourly record of everything he did. The diary entries confirm that he was merely continuing the work that was already underway. He mounted and identified specimens until after the Easter holidays, and then was off to the field. (61)

The few RBG staff members who knew him recall a vivid image of Tamsalu in those days. Especially remarkable was the vigour with which he devoted himself to his works. He is remembered as tall and thin, with a drawn face, sallow complexion, and short, grey-blond hair. He kept much to himself, associating little with other staff members except Ray Halward. But from early spring to late fall, one could find him out in the woods on any week day, dressed typically in his fedora, plaid shirt, baggy trousers and a leather jacket. His pockets stuffed out of shape with note books, with a plant press in one hand and a large briefcase full of texts in the other, he could be seen ranging along the steep ravine hillsides with the gait of a teenager.


Properties of the Royal Botanical Gardens ·1958·
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Township of
West Flamborough
Town of Burlington
Rock Chapel
Hendrie Park
Arboretum
North Shore
RBG
HEADQUARTERS
Woodland
Cemetery
N
Desjardins Canal
Cootes Paradise Sanctuary
Princess
Point
Town of Dundas
South Shore
Cold Spring Valley
McMaster University
Churchill Field
Sunken Gardens
City of Hamilton

But the vigorous outward appearance belied serious underlying problems. A tell-tale signal was that for the first time in his letters to Leppik, he began writing in concrete terms about his own death. He began describing himself with such adjectives as "old", "wornout", and "meagre". There should have been little wonder over his attitude, for he had a great deal about which to feel old and wornout.

His over–exertion of the previous year, and his ensuing confinement in hospital, had obviously not conveyed any message to Tamsalu. All summer he forged ahead with his work, fully intending to finish the floristic survey of Cootes Paradise that same year. In doing so he disregarded warnings from several directions not to strain himself. By the time autumn frosts had forced an end to his outdoor work, he had collected over 750 ecological analyses and between 6,000 and 7,000 plant specimens. Yet in spite of the impressive volume of his work, he felt unsatisfied over the fact that there were still gaps in his collections.

In some ways, this had been a summer of great contrasts. Though his workload had been heavy, he felt sure he had rebounded to good health. His day-to-day life had all the outward trappings of calm uneventfulness. Living with his daughter's family in their newly-purchased home, he enjoyed the evenness of domestic life without the attendant burdens. His only household duty was the gardening, which he really undertook for relaxation. Within the strict bounds of the family, he was a paragon of kindness and generosity. But the usually placid exterior disguised a brooding temperment. The evidence - his letters, notebook and record entries, eyewitness accounts, even the remarks on his herbarium specimens - leaves no doubt that Tamsalu spent his working hours in a tense state of frustration.

The underlying cause of his state of mind seems to have been the fact that his new job had burdened him with somewhat foreign responsibilities. For the first time in his life, he found himself in the role of a plant taxonomist, whose main duty had shifted from ecological studies to creating a herbarium. As a phytosociologist, taxonomy had always been an important part of his work, but never before had he needed to deal so intimately with the North American botany manuals, especially *Gray's Manual* edited by Dr. Merritt L. Fernald. The more conversant he became with *Gray's Manual* the more irritated he became about its weaknesses and inconsistencies. Simultaneously his contempt grew for its editor, Dr. Fernald. He took the matter very seriously because he was so profoundly involved with his work. This is not the place to outline Tamsalu's often correct and justified points of criticism. Suffice to say he vented his irritation at every opportunity. His personal copy of Gray's Manual became a mess of pencil marks. The margins were spattered with commentary: corrections, quibbles, vicious personal invective against Fernald. Some pages were completely scribbled out with Tamsalu's own inserts glued in their places. In letters to Dr. Leppik, Tamsalu would rave for paragraphs at a time about the sad, regressive state of North American botany, and the likes of Fernald in particular: "In my opinion, the authorities over here have taken the stance that the more muddled you make things, the more intelligent you seem". (83)

Tamsalu had difficulty relaxing after a day's work for his tension spilled over into other areas. Often immediately after dinner, he would disappear to his room to write letters or read, and would not be seen again until morning. On sporadic occasions, the emotional undercurrent would suddenly surface. Without warning he would burst forth delivering an angry monologue on almost any subject: communism, capitalism, advertising, religious sects, human values, American scientists or the savagery of American football. These orations were always set off by something he had just read, or heard on the radio, and as soon as he had discharged his views he would disappear back to his room as quickly as he had come. With no respite, this irascible behaviour slowly eroded Tamsalu's health

as surely as overworking had done the previous year. The inevitable consequence came not only suddenly but at the most inconvenient moment.

The American-based Arctic Institute of North America was planning an expedition to Alaska, during the summer of 1956, to study insect pollination on the tundra. Since that was one of Dr. Elmar Leppik's main areas of expertise, one of the research positions was offered to him. Existing commitments did not permit him to accept, but he immediately recommended Tamsalu for the job on the basis of his alpine work in Germany. It was agreed with the Institute that if Tamsalu were available he would work closely with an entomologist, Tamsalu's duty being to collect and identify plant specimens. At the end of October, Leppik wrote to his friend, laying out the proposal and pressuring for an immediate decision. (86)

When the letter arrived in Hamilton, Tamsalu was in no condition to deal with it. He was having a severe bout of illness — another sudden recurrence of his chronic stomach problem that had forced him to bed for two days. In spite of his incapacity he wrote to Leppik immediately saying that he was honoured to have been offered the assignment, that he felt he would be ready in time, but he needed a week or ten days to recover from his illness and to discuss the required leave of absence with his Director.

Tamsalu was too impetuous to wait for a normal recovery. He went to work the following morning. The Arctic Institute proposal was put forward to Laking that same day. While Laking deliberated, Tamsalu pondered the ramifications of what he was doing. He certainly wanted the Alaska trip if only to satiate his own curiosity. On the other hand he had new plans for local projects which he had wanted to start in 1956, and more importantly he had numerous projects under way. What if the Alaska trip took a year of his time and he should die before completing the projects upon which he was already working? Since he was using an obscure European method and much of the organization was in his own mind, who could possibly finish his work? Still, in the final analysis, the rare opportunity to emulate Lippmaa by exploring new terrain, outweighed the drawbacks. He decided he would go provided his health remained good. It didn't.

Obviously Tamsalu had tried to return to work too soon. Late in the afternoon on the second day back serious complications developed. He began hemorrhaging in the digestive tract. He was rushed to hospital; the bleeding was stopped; but Tamsalu's doctor, now increasingly concerned about his patient's condition, decided that a complete physical and a battery of tests were in order. Tamsalu was sent home to wait for a hospital bed and on November 6th, he was admitted to St. Joseph's Hospital in Hamilton where he endured nine days of "poking and prodding". He used the leisure time to good advantage.

Earlier that summer Tamsalu had visited Ipperwash Provincial Park, and the resort area of Port Franks, in pursuit of his studies of the location of the northern boundary of the Carolinian zone. Now with time on his hands, he began to prepare a rough copy of a paper entitled *Vegetation of Ipperwash and Port Franks*. After that was underway, he worked out a time-table for completing his projects at RBG. Also while he was in the hospital, he received the permission he required from Laking to take whatever time he needed for the Alaskan expedition. With somewhat uncharacteristic caution, he decided to find out more about the salary arrangement before committing himself. (31)

Tamsalu was finally released from hospital on November 15th. To his relief, and their puzzlement, the doctors had found nothing physically out of order that could have accounted for the bleeding. They concluded that he had merely had an intestinal infection of some sort, or had accidentally ingested some plant poison, or a bit of glass. But in the interim he had lost a great deal of weight; he was exhausted and not thinking clearly. He

even admitted his nerves were overtaxed, and that he needed a holiday. Stubbornly he refused to take one. Instead, he applied his remaining week of vacation to the time he had spent in hospital, and decided to get back to work as soon as possible.

Tamsalu would have gone back to his laboratory only two days after leaving hospital, only some extremely cold weather influenced him to stay home and work there instead for the remaining two days of the week. That small amount of work was the last he did for quite sometime. That Saturday evening he awoke just before midnight in the throes of a coronary attack. He nearly died. He was rushed back to St. Joseph's Hospital where he was revived and put under care for more than a month. The doctors allowed him to go home on December 22nd, just in time for Christmas. Tamsalu had always recovered quickly from misfortunes. Even the hit-and-run accident in Connecticut had only kept him off work for five weeks. But this time things were different. The heart attack had left Tamsalu drained and gravely weakened.

When he finally returned to work on February 20, 1956, he had to ease slowly into a normal routine. Long, regular rest periods were needed during the first few days in the laboratory. Even in spite of those, he was too void of energy to finish the first week. He missed the last two days. By the next week he was back to a regular schedule - even working two weekends to make up the hours he had lost. Unfortunately those responsible for payroll did not realize he had worked extra hours. When Tamsalu found out that two days' pay had been deducted, he was indignant. In his daily journal he wrote caustically "I have work to do, not hours to fill". Tamsalu was becoming himself again.

The mounting and identifying of specimens resumed. Of all the plants collected in 1955, well over a third were discarded because of Tamsalu's exacting requirements. If a specimen did not dry well, if the colours had faded, if it wasn't completely intact, if it didn't display all the typical features of the taxon he thought it should, Tamsalu would discard it and make a note in his field book that a replacement had to be collected. Until he was able to resume field trips in late April, this was how his time was spent.

Whatever lessons Tamsalu had learned from his experience with thrombosis, they did not remain with him long. True he made certain concessions; he was more careful with his diet; he tried to get more sleep; he even gave up tobacco and alcohol (except for his favourite, cognac, which his doctor allowed him to retain in case he should feel the onset of another attack). However, before long he had slipped back into the morass of emotions and attitudes that had helped to spawn his heart problem in the first place. He resumed his ceaseless and vitriolic attacks on enemies, real and imagined. Fernald came in for more abuse in his notebooks. And now he carried on about missing the trip to Alaska as well.

Tamsalu admitted that his ordeal had left him "barren of ideas" for sometime. By mid-June, however, he was either involved in or hatching several new projects. Beginning with the horsetails, genus *Equisetum*, he had started to arrange the herbarium collection into phylogenetic order according to *Gray's Manual*. It was hoped that his collection would be completed by the spring of 1958. In connection with the herbarium work he was preparing a manuscript, entitled *The Wild Vegetation of the Royal Botanical Gardens*, which listed every native species in Cootes Paradise and Hendrie Valley, with notes on location and abundance, and remarks on certain points of description. The Rock Chapel property had also been briefly explored and tentatively divided into 50 ecological units. He was hoping eventually to extend his studies in that area, expecting to get perhaps another 100 new species from the escarpment to add to his herbarium collection. The field trips for the year concentrated on surveys of Hendrie Valley and Coldspring Valley, with occasional trips to Cootes Paradise to replace discarded specimens. (37)

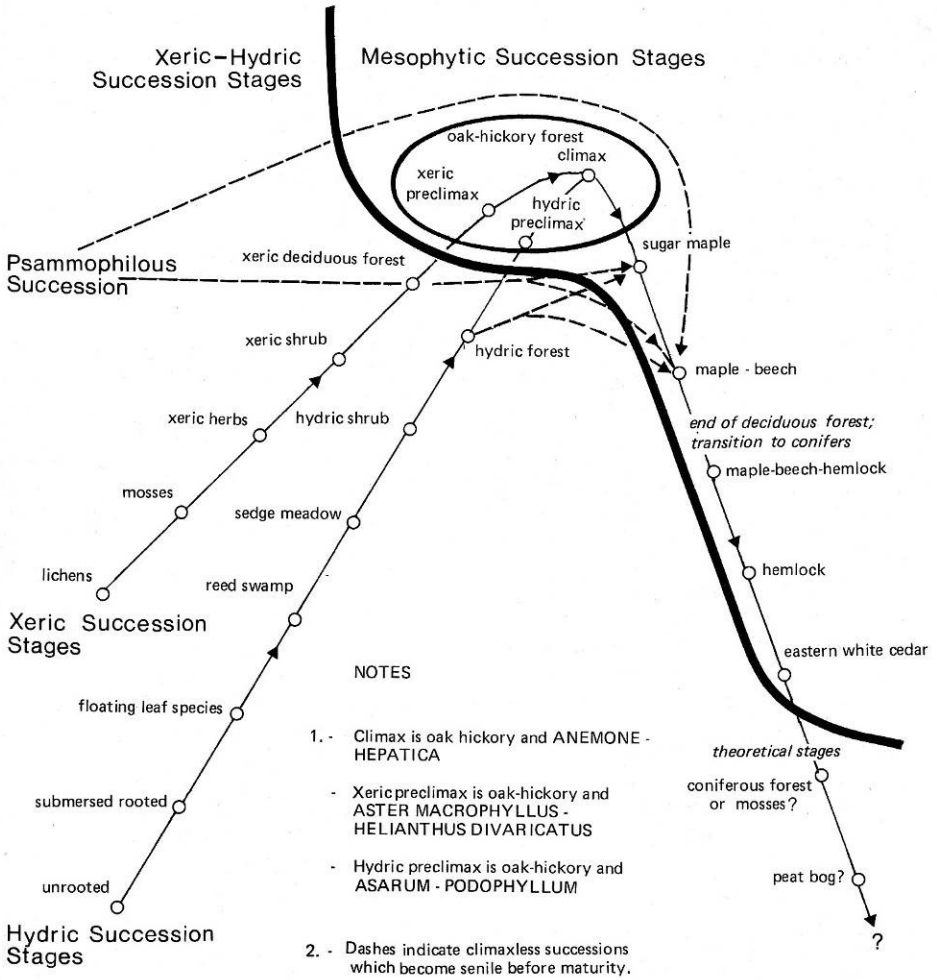
In his spare time Tamsalu had adopted a new line of thinking. Based on the research he had done on vacations and at RBG, he was beginning to feel he had enough information to write a rather detailed paper on plant communities in the Carolinian zone of southern Ontario. This project, which he hoped to finish also by the spring of 1958, was to include data from 200 plant associations he had studied according to Lippmaa's theories and methods. But the more he thought about the project, the more concerned he became about contemporary views on the whole question of plant succession. He was especially puzzled by the use of the ecological term "climax".

The puzzlement became an obsession to the point that he was "tormented even at night by the question 'What is the climax?'." In June, he wrote a paper by that title in the Estonian language in which he clearly and concisely outlined his views on the matter. The paper was never translated into English, and the only person who ever read it was Elmar Leppik. This was very unfortunate since that paper and some of his covering letters, would have done much to clarify the premises and terminology of most of the papers Tamsalu wrote in English. (89, 33, 91)

His concept of the climax diverged from widely accepted views on two points. At that time the climax was viewed as an end point of succession: a stable, self-regenerating community of species from which no further development would proceed under stable climatic conditions. The idea was popularized by F.E. Clements, an American ecologist who did most of his influential writing from 1905 to 1929. Tamsalu retorted at the end of his paper: "I will accept the successional stages put forward by Clements, and agree to the fact that in different climates successions will be different, but I refuse to accept that there exists a vegetational association from which there is no further succession or evolution". Thus, he contended that the terminology associated with this concept of an endpoint was inappropriate. He believed that the word "climax" should not be used to designate a community simply on the basis of stability over a period of time, especially since that community would ultimately be replaced. The term "climax", he argued, should be applied to the highest or most complex stage of development in the succession, the level of complexity a direct function of the number of plant species both present and typical of that community. In the southern Ontario Carolinian zone, oak-hickory, with an *Anemone-Hepatica* understory, was considered by Tamsalu to be the successional turning point or "climax" from which development tended toward less complicated forms. (Etymologically, the word climax means "a turning point"). The oak-hickory community contained up to 140 species; the maple-beech (a more stable community, widely defined as the climax forest) only 30 to 40 species. Maple-beech was regarded by Tamsalu not as the "climax" but as the "last stage of deciduous forest succession" before it too progressed. Tamsalu's observations and those of some of his contacts had led him to believe that eventually, even if it took 1,000 years, the maple-beech forest would be invaded by, and ultimately replaced by, such shade-tolerant conifers as hemlock and white cedar. Independently, in his writings, Tamsalu began using his own terminology, a factor that caused confusion among those who tried to review individual pieces of his writing. (33)

And so the summer of 1956 continued, with Tamsalu digging away at his various projects. He was constantly reminded of his physical weakness. During the course of the summer he suffered two attacks of angina. The second one, at the end of August, put him back in hospital for a week and at home for a further week of convalescence. Following that event both Leslie Laking and Tamsalu's daughter forbade his taking any more field trips that year. This time he had to relent. The doctors had warned him that he would never regain his health unless he took better care of himself. Tamsalu was at least heartened that he had diligently collected the fall aspect of the wild vegetation the previous year. There were few gaps left to fill. For the most part he obeyed orders during the fall of 1956, taking only a few short field trips - always accompanied by someone else. His health once again began to improve.

Vegetation Succession Stages
for the Carolinian Zone of S. Ont.



· Proposed by A. Tamsalu in 1957 ·

On November 6, 1956, he wrote an illuminating letter to Dr. Leppik. Tamsalu was still digesting information on the vegetation of the Carolinian zone and his concept of the "climax". He stated that he now had about 1,000 ecological analyses collected in North America. Of those he claimed there were 150 that he could arrange in a serial progression to show a gradual and uninterrupted series of links for both hydric and xeric succession to the "mesophytic oak-hickory, *Anemone-Hepatica* 'climax' " (by his definition of the word), and a similar but less definite chain on the decline from oak-hickory, through maple-beech and hemlock, to pure white cedar forest. (91)

Dr. J.S. Olson, an acquaintance of Tamsalu from his days in Connecticut, was still on staff at the Agricultural Experimental Station at New Haven, Connecticut. Tamsalu wrote to Olson inquiring about his views on the role of eastern hemlock in the dynamics of hard wood forest succession. In his reply, Olson recited a long-held view that he had observed hemlock to be spreading in hardwood areas now that fires were well controlled. The reply lent credibility to Tamsalu's opinions on the role of conifers generally in hardwood forests. Tamsalu had now made up his mind to investigate further the place of cedar and hemlock in succession when he had spare time. (92, 93)

He spent his winter working on two new manuscripts. One of them, a short paper on plant succession and floristics in the Carolinian zone, was not finished until near the end of 1957. The other manuscript, completed in March, was titled *Climaxless Vegetation Succession: Cases in Southern Ontario*. He gave the manuscript for editing to Raymond Sims, the Gardens' corresponding secretary, a young man who had had some background in natural history. Sims edited the manuscript promptly but corrected only the grammar. Apparently he didn't feel qualified to comment on the substance of the paper. The paper was rewritten and mailed, in May, to Dr. Oosting, one of the few American botanists whose opinions Tamsalu still respected. Whether the paper would be worth publishing in the journal *Ecology* was the question foremost in Tamsalu's mind. (34)

No manuscript could have presented a greater enigma to its readers than this one. Basically, the paper was written to report some observations Tamsalu had made in southern Ontario, where "unfavourable conditions" had caused plant succession not to proceed in a regular manner. Note was made of certain situations where succession, from either xeric or hydric forest, proceeded directly to the maple or maple-beech stage, completely bypassing Tamsalu's mesophytic oak-hickory "climax". Such successions he referred to as "climaxless" - his best choice of terms at the time. To anyone who had read the paper *What is the Climax?* and some of his letters on the subject, his manuscript would have made perfect sense. But to Oosting, it was meaningless. Oosting could hardly have been blamed. Tamsalu had gone to great lengths to explain the exception without having explained the rule. Since he did not understand Tamsalu's use of the term "climax", Oosting could not possibly have understood what he meant by "climaxless". He wrote a two-page letter to Tamsalu explaining with excessive tact that he hadn't any notion of what Tamsalu was trying to say. Of course, Tamsalu found this reply very upsetting. He wrote back to Oosting trying to reword parts of the paper, but the correspondence was never pursued. He sought consolation from Dr. Leppik, convinced now that there was conspiracy against foreign scientists who tried to present new ideas. (94, 96)

For weeks, Oosting's reaction preyed on his mind. Still there were many other concerns and Tamsalu made every effort to redirect his attention. His major work on the southern Ontario Carolinian vegetation was already well advanced. He now expected to finish it by late 1959. But his shorter paper, touching on the floristics of the Carolinian zone, was nearly complete. Since the entire Carolinian zone study had been done from a perspective unfamiliar to most North Americans, Tamsalu had decided to present the floristic paper as an introduction to the larger work. Meanwhile there were two Ontario vacation trips planned for this year: one in mid-July, to examine the various evergreen

species of the hardwood forests around Horseshoe Lake, in the Parry Sound district; and the other in mid-August to Guelph, Galt and Kitchener, to investigate a section of the northern border of the Carolinian zone, the location of which was in some dispute. On this latter question, after five days of performing analyses Tamsalu made his declaration. The northern border did not dip southward into the Tillsonburg area as had been suggested by some authors. Instead, it passed through Wellington County exactly as indicated by Montgomery in his book *A Botanical Survey of Wellington County*. Tamsalu thereafter referred to Montgomery's book as "this wonderfully correct work". After all, Montgomery had agreed with the findings of Lippmaa's method. (55)

As far as Tamsalu's work in systematics at RBG was concerned, by November 10, 1957, he declared to Leppik that the outdoor portion, the actual plant collecting, was "completed, not just this year but forever". Now he estimated that the herbarium, when completed, would contain 9,000 specimens representing 1,900 species: a well-organized systematic collection with specimens showing both ecotypes and seasonal aspects. His mounting and filing had progressed "half way to the Rosaceae". The accompanying text on the wild vegetation of RBG was projected for 200 pages. "This is not junk gathered from here or there by a student, but systematic material", he assured. Summing up all his work, Tamsalu concluded: "...if I could have but three more years of life, it would be possible to do something with respect to the vegetation which would not soon be forgotten". He hoped he would live long enough to see some of his work recognized on the North American continent. (97)

The nine-page manuscript about the floristics of the Carolinian zone contained a statistical breakdown of some 2,100 plant species known to exist in southern Ontario's Carolinian zone: first, according to their centre of geographical distribution; and second, based upon Raunkier's life form spectra (how each species survived the winter, i.e. as seeds, bulbs, woody stems, rhizomes, etc.) But the great majority of the paper was devoted to detailed descriptions, complete with "total estimate" figures, for xeric, hydric and mesophytic oak-hickory associations (Tamsalu's "climax" communities,) and maple and maple-beech stages, (Tamsalu's "final stage in deciduous succession", but the "climax" according to conventional thought.) The paper was given the ambiguous title: *The Study of Ontario Deciduous Forest (D1)*. (35)

Content that his new paper would herald a breakthrough in North American plant sociology, Tamsalu began looking for a publisher. Copies were sent to Dr. Oosting, the *Canadian Field-Naturalist*, and the Royal Canadian Institute. Oosting was informed that the second follow-up work, on the Carolinian vegetation, would require two more years. While awaiting replies, Tamsalu prepared yet another paper, a collection of theoretical ideas he hoped to test in the field. The title was self-explanatory: *Theoretically Possible Climaxes of Ontario Within Hydric Successions*. (36)

The new year, 1958, began badly. *The Study of Ontario Deciduous Forest (D1)*, met with outright rejection. To begin with, Dr. Oosting never even acknowledged receipt of the manuscript. It may be that he had grown tired of commenting on an endless series of Tamsalu's manuscripts, especially since Tamsalu never seemed to follow up on the criticisms or to try to improve the manuscripts once he had finished them. The *Canadian Field-Naturalist* rejected the work as unsuitable due to its "inconclusive nature". On that Tamsalu made no comment. But what really irked him was the reply from the Royal Canadian Institute, for they returned the manuscript with a full type-written page of criticism from an anonymous reviewer. (Reviewers are usually kept anonymous but Tamsalu did not seem to have realized that fact.) One cannot fault the reviewer for not understanding the basis of Tamsalu's paper, due alone to the idiosyncracies in its terminology. When Tamsalu used terms such as "Climax", or "deciduous forest (D1)", the reviewer took entirely different meanings from those intended. Thus when Tamsalu

wrote: "Ontario deciduous forest (D1) occupies a small section of Ontario south of the line Toronto-Grand Bend", the critic snapped back: “The deciduous forest of Ontario occupies a considerable portion of the province and has a diverse composition over this area". The reviewer did not realize that "D1" was a code number assigned to the "Niagara section" (i.e. Ontario Carolinian zone) of the Deciduous Forest Region by W.E.D. Halliday, who had prepared a forest classification system for Canada in 1937. This type of cross-up, combined with Tamsalu's broken English, gave the reviewer the impression Tamsalu hadn't even a basic grasp of his subject matter. Of the nine specific criticisms levied, seven of them arose because the reviewer misunderstood Tamsalu's terminology, or because Tamsalu had not explained his methods or premises. What really stung, however, was the "general criticism" the reviewer had written at the bottom of the page: "The life form spectra should be explicitly presented. This would make a very fine contribution to Ontario ecology - but there should be less or no mention of the dynamics of the forest. One can also question the division into three kinds of oak-hickory forest.. It has to be demonstrated, not just stated". (128, 46)

Tamsalu's angry reaction to the "general criticism" was later conveyed to Leppik: "The part which the critic praised so highly was the part that did not even belong to me. The biological spectrum data with respect to the U.S.A., similarly the basis for placing any species according to distribution areas, are completely taken from Ennis' doctoral thesis of 1928. For Ontario, I put together something myself, but also completely on the basis of books, marking a new list for each of Ennis' distribution areas; also Raunkier's spectrum data, using about eight books. This desk work, rather "digest", of about 300 hours' work is found to be the only worthwhile thing in my writing, since my seven years of research results have been ordered to silence by the critic, that being his monopoly". On the matter of distinguishing the three types of oak-hickory communities, Tamsalu had selected and analyzed those communities, doing everything correctly according to Lippmaa's methods which he had used since 1931. The type of report he had written would have been accepted as a matter of routine in Estonia, during the independence period. This was perhaps the main reason why he reacted so sharply on being rejected, "I wonder", he wrote, "what Mr. X (reviewer) had in mind stating that those three kinds of oak-hickorys must be not only stated, but proved. My writing just gives characteristic compositions for them. Is not Mr. X able to read an ecological analysis? ... Germans...use and translate my European materials, but it seems Americans cannot even read them". In point of fact, the reviewer had probably never seen such an analysis before. Subjective methods were not favoured at the time. (102, 99)

Tamsalu demanded of the Royal Canadian Institute to be given the name of the reviewer. Getting no satisfaction in the attempt, he sent the paper and the comments (for appraisal) to Dr. J.H. Soper at the Department of Botany, University of Toronto. Soper replied that he felt the criticisms were "probably valid", although he was "really not qualified to pass an opinion". Not qualified? No one in the Province was more qualified. Soper probably had no intention of taking sides in a heated debate. (101)

From early December, 1957, until February, 1958, during the thick of this furor, Tamsalu was now and again ill with the flu. At one house call the doctor was very angry with him because Tamsalu in his agitation refused to rest when he wasn't feeling well. His weight dropped by ten pounds that he could scarcely afford to lose. When the dust had settled over the "Deciduous Forest" manuscript, Tamsalu's mood had soured and his will to work had been extinguished. He shoved all his Carolinian zone studies aside and didn't look at them again for several months. In a state of apathy, he went back to working regular 40-hour weeks and only dealt with the herbarium-the work that he was employed to do. By May he wrote to Elmar Leppik that he was in a great depression."I have the purposeless life of a typical old person, working, eating, and sleeping? I can't

sink any lower". Of his work on the herbarium, he was no more optimistic: "Final completion will take at least two or three years, and I doubt that my health will last that long". (102)

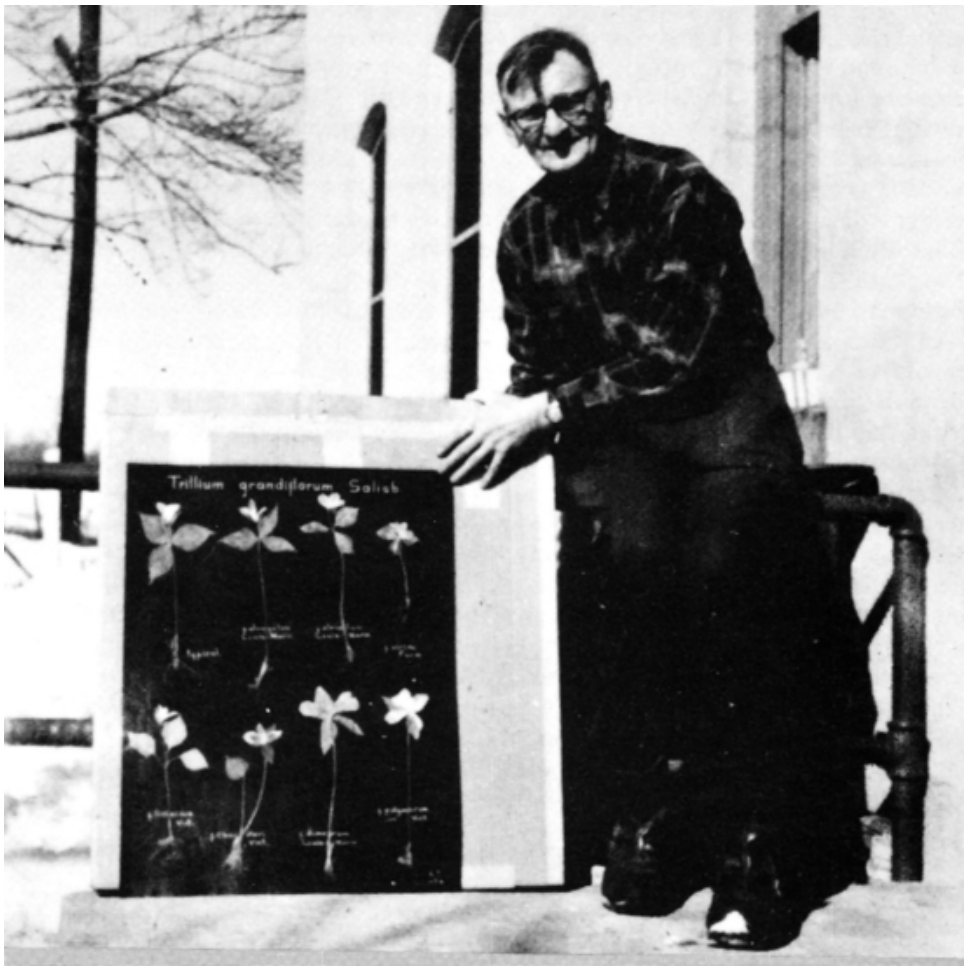
Understandably, Leppik was not pleased to learn that Tamsalu was living in such a state. He quickly replied with a heartening letter in which he encouraged his friend to slough off the discouragements he had suffered and press on in his writing: "In my opinion you should write more now instead of leaving your broad experience and material for others. You could give all your energy and time to plants; not all botanists by far have comparable working conditions...In my opinion, that criticism which you sent me to read was well intentioned, and you should continue to write that work — and in more flowing language". (103)

To receive such a letter from someone he so admired gave Tamsalu the courage he needed to snap out of his lethargy. By the end of May he was working overtime again with a vengeance. In 1958, his duties on behalf of RBG included three distinct phases. Of course he continued identifying and mounting specimens such that by the end of the year he had reached the family Ericaceae - three-quarters of the way to completion of the herbarium. Also, he continued to fill gaps and re-collect specimens. He was especially careful to replace the two species of *Hepatica*, and 28 of *Viola*, in all the different shades of colour. Many sedges were also added to the collection. But the main thrust of his work, in 1958, was a new project on the hawthorns, genus *Crataegus*, in the Hamilton area. Existing manuals, he declared, treated the genus "very poorly". He decided he would have to sort the matter out himself, and produce a special album of the genus based entirely on his own field studies. His intention was to catalogue all the diagnostic parts of as many taxa as he could. He would photograph, sketch, measure, collect in triplicate and describe verbally the flowers, fruits, shoots, stipules, thorns and so on. Only fresh material would be used. (A major Tamsalu criticism of the manuals was that the authors seemed to rely too heavily on dried material). This project began slowly with isolated field trips, but at the end of May, when the hawthorns bloomed *en masse*, he took to the field with his camera, usually working nine hours without a rest break. Trees were labelled so he could return to them. He spent six more weeks in the autumn working exclusively on the hawthorn fruits.

Tamsalu made another decision as a result of Leppik's letter of encouragement. He would completely rewrite his paper *The Study of Ontario Deciduous Forest* and he resolved that he would live to see his ideas vindicated, and see the paper published in an English language journal. A completely new approach was devised for the project on the Carolinian zone. He decided to divide his treatment into two large sections. The first section he retitled *The Study of South Ontario Vegetation, I The Flora*. The larger follow-up writing, on the plant communities of the Carolinian zone, was to be designated *Part II, The Ecology*.

As a finished product, the paper on “The Flora" would be so unlike its predecessor in style and content that it could actually be construed as an entirely new work. The reasoning behind his new approach was uncharacteristically practical. Previously he had tried to present his analyses without sufficient background introduction. In the original paper Tamsalu had intended his material on the geographic distribution of Raunkier's life forms to be merely an opening statement before the presentation of his oak-hickory community compositions. But since the Royal Canadian Institute reviewer had praised that section as the only valuable part of the paper, Tamsalu decided to write a new paper entirely on that theme.

During 1958, Tamsalu spent almost all his summer evenings arduously leafing through manual after manual on the flora of eastern North America. He assigned a Raunkier life form classification to each species, and then assigned each species to a second category according to the centre of its geographic distribution. He summarized his intentions as follows: "On the basis of this data I want to clarify, a) what sort of region does southern Ontario's vegetation have the most similarity with and, b) what plant species would be characteristic for southern Ontario". At last Tamsalu was on the right track. For a former propagandist it took him far too long to realize that if he were going to promulgate his ideas about phytosociology, he would have to begin by approaching the North American scientific community on its own terms. How different his life in North America might have been if Tamsalu had forsaken his stubborness earlier, and had bent a little in his approach to his work. Now as circumstances would soon prove, it was too late for reform. Throughout the summer, and into the autumn, Tamsalu spent 700 hours reviewing well over a dozen floras and manuals. Rushing to recover the time he had wasted, he devoted virtually all his waking hours to botany. (104)



*Tamsalu displaying chart he had prepared on the forms of common trillium (*Trillium grandiflorum*). Probably early spring, 1958.*

Apart from this significant revision of his thinking, there were only two other important events in Tamsalu's life that summer: the opening of a new Royal Botanical Gardens headquarters building, on June 25th; and a working vacation he took at Lake Wanapitei, near Sudbury.

There was a minor incident at the headquarters opening that made quite an impact on Tamsalu - so much so that a year later he was still recounting the incident in writing to an Estonian newspaper. Tamsalu had gone to great pains to prepare some charts of his plant specimens which the Director hung at the grand opening as an exhibit. One of the charts was a collection of all the forms of the common trillium listed in *Gray's Manual*. Tamsalu was proud that his trillium chart drew the attention of many visitors, but as he strolled about he was horrified to discover a photographer from the local newspaper posing a rather buxom young lady in front of his exhibit. To Tamsalu this was an unspeakable opprobrium. He confronted the bewildered photographer demanding to know what possible connection there could be between "this television girl" (a supreme insult in his mind), and these "deeply scientific charts". He concluded by abruptly ushering them away. (108)

The vacation at Lake Wanapitei featured an incident of quite a different sort - a test of physical endurance which very nearly had serious consequences. "The 'tough old man' endured", he later wrote, "when I got lost for about three hours in the Wanapitei under brush without knowing where to go or where I was until, from a high mound, I got an overview that I had strayed about four or five miles southwest of my intended direction. I didn't even have matches in my pocket to make smoke signals. At one point, my heart began to beat irregularly, but it subsided when I took the required pills that I always carry with me". For a long time after his vacation, he did not dare to tell his daughter Aino about the incident for fear she would put a stop to his field work. (104)

The summer of 1958 was generally cool and wet. Several times a whole day's work was erased when a sudden rainstorm soaked Tamsalu's plant press. Often he had to abort time-consuming trips to remote parts of RBG property when the weather interfered. That problem continued into the fall when Tamsalu tried to resume his *Crataegus* study. Two weeks of October rains ruined his chances of concluding the autumn phase of the study that year. The remainder was deferred to 1959.

Tamsalu had many plans for 1959. He wanted to attend the IX International Botanical Congress in Montreal in August. He hoped to study the forests of Algonquin Park. His *Crataegus* and Carolinian studies, as well as the herbarium, were all slated for completion in 1959. In fact, he would make it to the Botanical Congress. But his other goals were distant and ephemeral, soon to evaporate in the face of harsh realities which the new year would usher in.

VIII

FINAL DECLINE

During his later years, Tamsalu's voice was always high-pitched and strained. In Hamilton, he had gone several times to a throat specialist, but the cause of this symptom was not found. There was a rumour prevalent that he had been punched in the throat by Russian soldiers during his interrogation at Põltsamaa in 1940. He neither confirmed nor denied it. Toward the end of 1958, his voice problem became ominously worse. The peculiar hoarseness increased until he had to shout to make himself heard. Since childhood his lungs had been weak; he had had pneumonia three times. Now that infirmity also worsened; his breathing gradually became laboured and more rapid than normal.

Of late he had been ill more and more frequently. When January, 1959, arrived he was grappling with a heavy bout of flu. While hardly having the strength to drag himself about, he put in a full week of lab work instead of resting in bed. How many times had his doctor warned against such indiscretion? Yet still he paid no attention. The spectre of his final days haunted the back of his mind, and he was at war with it. There was so much work left to be done.

As had often been the case, this latest illness led to complications. On Sunday, January 11th, he began bleeding from the lungs and was admitted to hospital. Bacterial pneumonia was diagnosed. He was kept in hospital for three weeks and at home for an additional week. The pneumonia cleared up. His lungs did not. For weeks they hemorrhaged sporadically while he also suffered recurring attacks of flu. Throughout the ordeal, he continued the work on his herbarium. On April 6th, he outlined his situation to Leppik: "Work goes ahead. Lately the RBG assigned me help for the purely mechanical work; I have myself not done any work but identifying plants and choosing them for mounting. ... I will arrive next week at the Compositae ... My last number showed 5300. The month of May will be completely lost on separate work for the research of *Crataegus*, similarly the second half of April, and then a few months of rooting around in this material. Right now I have in the checklist 58 species and subspecies ...

"It is unfortunate that my heath is so steeply declining. I would like to finish this work. This would be knowledge, not simply bungling with chance material as I have done up to now …

"Just after New Year's I had a sickness in the lung and up to now it hasn't healed. I've been going to work since the first of March, but I am weak and in the evening I am not capable of doing anything because I am so tired. I don't know if maybe this will be my last year. I registered myself for the International Botanical Congress, and for a short tour. It will be good enough if I can get that before death." (105)

On the same day he wrote that letter, Tamsalu distributed copies of his manuscript, *The Study of South Ontario Vegetation, I. The Flora*, to Laking, Leppik, Soper and Montgomery, soliciting their opinions. This paper he was determined to see in print even if it meant investing his own money to publish it privately.

Less than a week later his lung condition was so poor that he was forced back into hospital for tests. This time he learned the sobering truth that he had lung cancer. He stayed at home for a week, and then it was imperative that he begin regular cobalt treatments. From the end of April until the third week of May, he went on half-pay while submitting to the debilitating ritual every afternoon. Working outside was impossible. He was too stricken from the therapy.

Uppermost in his mind was the *Crataegus* study. Fortunately the weather had remained cool throughout most of May. The hawthorns were a little behind their normal blooming period. When he returned to regular working hours on May 25th, he went straight to the field, working full-tilt to recoup lost time. He had estimated that he needed at least three solid weeks to cover the spring aspect of the genus. However, circumstances would not co-operate. During the week he returned to work, there were three days of very high temperatures which suddenly brought most of the hawthorns into full flower. The heat, followed by a heavy weekend rain, ruined most of the blooms. Tamsalu noted that to further complicate matters the "cultured younger generation" had diligently destroyed many of his identification labels, making it difficult for him to relocate his specimens. He took a few more field trips in June, but by then it was depressingly clear that he needed one more spring season to finish the *Crataegus* project.

On other fronts, Tamsalu's spirits were lifted. The doctors told him that his lungs were "healing nicely". "Thus it seems," he mused to Leppik, "that I belong to that five percent who escape from lung cancer with their lives ... Weeds are not easily destroyed. And what else are we immigrants in this blessed land ... but pure-blooded weeds." Even his voice had improved slightly. (107)

Encouragement came from other directions. Dr. Soper had some favourable remarks about Tamsalu's paper on the Carolinian zone: "I found it very interesting as it parallels work that I am doing on the affinities of the flora of southern Ontario ... Your life-form classification is also very interesting ... If I understand your conclusions correctly, your vegetation studies support the position of the boundary for the Carolinian zone … as proposed by Fox and Soper in 1954". (106)

"Thus it seems." concluded Tamsalu, "that I have started to turn into the right vein to find a common language with the scientists here." Tamsalu had both Elmar Leppik and Leslie Laking edit the "South Ontario" paper. Upon typing the final draft, he had, for the first time, produced a manuscript in quite acceptable English. As soon as he had a chance, he would begin searching for a publisher. (107, 38)

There were three other projects to complete: the herbarium mounting and reorganization and the catalogue of wild vegetation of RBG; the *Crataegus* study; and The *Study of South Ontario Vegetation, Part II: The Ecology*. "If the Grim Reaper comes earlier to get me," he quipped dryly, "I'm going to be really fed up." (37, 39, 40, 108)

The earlier optimistic prognosis about Tamsalu's health proved to be wrong. Through mid-summer he languished. He began to lose his voice again. Only three weeks before the IX International Botanical Congress he contracted a high fever. He managed to shake it

off, however, remarking flippantly that he had no time to be ill. Still hurting from the effects of the sickness, he nevertheless had reserved his vacation for the Congress, and was adamant that he would be in Montreal on August 12th for the pre-conference excursions. His daughter protested but Tamsalu's doctor told her it would be pointless to try to keep him from something he considered so important.

Tamsalu attended the Congress representing RBG. The occasion was especially important to him as, by luck, this was the first IBC ever held in Canada. He surely knew there would not be another chance. At the Congress, he had the opportunity to witness the adoption of the Montreal Code, the latest version of the International Code for Botanical Nomenclature. Tamsalu's perennial concern was the standardization of plant names in the botany field manuals. (132)

As RBG's delegate to the 9th International Botanical Congress, Tamsalu poses at home after returning from Montreal, August 1959. He is holding a portfolio presented to delegates to the Congress. (see also the photographic supplement added to this biography in 2011)

Tamsalu was sick again in Montreal but he managed to get to most of the sessions. He even took part in some of the discussions - with a pencil and paper, since his voice was nearly inaudible.

After the Botanical Congress, Tamsalu returned to work on September 1, 1959. This September was unusually poor for field work. A heat wave persisted until September 9th which was the hottest day of the year. Wary of straining himself in such sweltering temperatures, Tamsalu delayed the start of his autumn field trips. Instead, he stayed inside working on the herbarium. He was now mounting specimens well into the Compositae family, the last plant family in the collection - also one of the largest.

When cool weather finally came, it came too suddenly. The first frost appeared only

eight days after the peak of the heat wave. With the coming of frost, the outdoor work on *Crataegus* became an immediate concern. He spent almost all of his time in the field, confining himself to the lab only on the coldest rainy days. Though very weak, he refused to slow down. When he missed a day through sickness, he continued to insist on working overtime to catch up.

There was additional pressure on his field work schedule at the beginning of October. For two weeks it rained every day while temperatures fluctuated capriciously. Tamsalu completed what he could of his hawthorn study in the lab, and then began work on the asters, the last large genus in his herbarium collection. The woodlands remained wet. Tamsalu stayed inside. At quitting time on Wednesday, October 14, 1959, he labelled and filed herbarium sheet number 5666, a specimen of *Aster ciliolatus* he had collected two years earlier. There were 302 numbers left to be mounted. And although he would never have accepted the fact, the remainder of his herbarium work was to be left to other hands.

Feeling he could wait no longer for the cold, wet weather to improve, he took an ill-fated field trip on Thursday. He was in no condition for it. He spent the morning collecting hawthorn specimens and noting which shrubs he would return to the following spring. By noon his clothing was soaked and he had to retreat home chilled and exhausted. He had again worked himself to a state near physical collapse. But this time he would not recover.

That Saturday morning about 4:00 a.m., he suffered another coronary attack. The doctor did not admit him to hospital but he remained at home bedridden for a week. On October 26th, he entered one line in his daily journal: "Try work again, but very weak". The rest of the book is blank.

Against every hope that his energy would return to him, he declined through the last days of the year. He did little or no scientific writing. Most of his time was occupied with reading. With his speech reduced to a whisper, he was taxed by conversation. But he occasionally wrote a letter. As late as November, he assured his son, George, that he had won his battle against cancer. In fact he had not. The disease continued to debilitate him until he was finally compelled to stay in bed. This was hard for him to accept for his mind was fully alert and active. In a bitter travesty of his data collecting talents, he refused to take medicine until he had first catalogued the dose in a notebook.

As early as 1954, he had recorded the first hint of what was to become an obsession when he drew a well-worn comparison between winter and death: "And there comes a time when, one by one, the leaves begin to fall and cover the forest floor with a deep, soft blanket in preparation for winter sleep. An autumn nature lover wanders along that blanket and thinks 'Here, in Nature, is the pattern of life itself. You display joy and beauty while young, culminate in middle age, show your fruits in maturity, live for a while a second youth. Then you feel cold winds warning that soon you too will have to go to sleep.'" (26)

The metaphor was not innovative, but it was appropriate. The cold winds blew through the Christmas season and on into the new year. At the end of January, Tamsalu was admitted to Henderson General Hospital where a week later, on February 5, 1960, his struggle finally ended.

IX

AN ASSESSMENT

The death of Aleksander Tamsalu was deeply felt by the small RBG staff. It was not unexpected given his state of health in his 69th year, but he was the second staff member to die in less than four months.* Contrary to his aspirations he left a great deal of work unfinished.

With respect to his herbarium collection, the highest accession number he had used did not accurately reflect the number of specimens collected. Not all of his specimens were numbered, nor were they all numbered according to the same system. Of those he did sequentially number, there were 5968. He had identified all of them and had mounted all but 302. The numbers were actually assigned as the specimens were entered in the herbarium, not in the field as is usually done. Hence the numbers reflected the phylogenetic order of *Gray's Manual*.

At first, volunteers from the RBG Members' Association were called upon to mount the remaining specimens, but by late 1960, a new, full-time herbarium technician, Miss Liivi Kond, had been assigned that task. Five steel cabinets were acquired to house the Tamsalu specimens. His collection more than tripled the size of the Gardens' herbarium. Even today, he remains by far its most prolific contributor.

In 1961, the mounting and identification was deemed complete. In reality there was much yet to be done. There were still over 2,000 unmounted specimens at RBG, mostly duplicates and some others needing annotation. Hundreds more remained in storage at his home for several years. There were other priorities. It was not until 1978, after a very long hiatus, that the work was truly completed by Miss Alicia Waller. Some of Tamsalu's duplicate specimens have been subsequently damaged and discarded, but there remain 9,803 Tamsalu specimens presently on file at the Royal Botanical Gardens. Eleven duplicates reside at the University of Toronto, and about 100 at the Department of Agriculture in Ottawa. (112)

Completing the work on Tamsalu's specimens was one thing. His manuscripts were another matter. As he had been well aware, no one else on staff had the ecological training to understand the work he had done. No one knew of the European methods of sampling. There were literally stacks of field books, reports, research papers, letters and sundry rough notes - many of them incomplete, all of them incomprehensible to those who had to deal with them. They were neatly packed into cartons and consigned to the archives where, over the years, they gradually lost contemporary relevance. (87)

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* Secretary Raymond Sims, age 37, succumbed to a brief, severe illness on October 18, 1959.

Nearly four years after Tamsalu's death. Dr. James S. Pringle assumed the position of "plant taxonomist" at RBG. He thus fell professional heir to the Tamsalu materials. Upon examining the writings he, like Sherman, Westveld, Leppik and Olson, acquired a certain respect and sympathy for the man and his work. Wishing to see if a posthumous publication would be possible, Pringle selected the "Rondeau Provincial Park" manuscript as the one which "might be valued by ecologists as a detailed record of the vegetation of an area which appears both ecologically unusual and probably subject to relatively rapid natural changes." (110)

For critical appraisal, copies were sent to Mr. W.K.W. Baldwin of the Canadian National Museum; Dr. W.S. Benninghoff of the University of Michigan, who had had some experience with subjective methods; and Dr. J. Roger Bray of the Department of Scientific and Industrial Research in New Zealand, whom Pringle incorrectly believed to have had some research experience in the Rondeau area. The consensus of the reviewers was that the purely descriptive parts of the manuscript should be published only after a rigorous excision of all theoretical and speculative references, and that the manuscript be completely rewritten because of the language. When it became clear to Pringle how much time and effort would be required to salvage the "Rondeau" manuscript, he reluctantly let the matter drop, and the Tamsalu papers returned to obscurity. (110, 111)

Some of the aversion to Tamsalu's theorizing was rooted in the fact that these botanists could not have been acquainted either with Tamsalu's endemic terminology or with Lippmaa's ideas. (Lippmaa published only one illustrative article in the English language, in 1939, following his only visit to the United States, and although it was greeted with polite curiosity, his "Unistratal Theory" certainly never gained widespread attention in North America). (55)

The criticism of his "Rondeau" paper would not have surprised Tamsalu. More than 10 years in North America had made him acutely aware of his linguistic shortcomings. And late in life, after his confrontation with the Royal Canadian Institute over his Carolinian studies, he became privately and deeply circumspect about his abilities as a theorist, especially since he was working in effective isolation:

> " ... I don't like well-worn paths, but try to find something new everywhere I go. This spirit has grown into me since university. A great number of my teachers were ... men who left the world something new, like Vavilov, Glinka, London, Kurbatov, Monastorski, Nadson, and others. I have followed in their direction but perhaps my wings are too short. ... In Estonia I had Lippmaa for support, also the type who looked for new things. Here, I stand [alone] ... There is no one to exchange thoughts with." … (102)

Two points come immediately to the fore. First, one must inevitably compare Elmar Leppik with Aleksander Tamsalu, for although they became close friends, who held many ideas and opinions in common, their approaches to communication were radically different. Once, after reading an awkwardly written manuscript, Leppik pointed out Tamsalu's weakness and described how he coped with the ordeal of writing in English:

> "I know how hard the language is. I often spend a whole weekend day nailing together a few sentences ... I usually take some similar work as an example for the construction of sentences, then I make some excerpts on a separate paper and look at which sort of sentence suits me the best. That is, of course, difficult and time-consuming work, but at least one gets most of it down and can pass it on to someone who corrects the language. Of course, in this country no one has the time to do work for another, but for good payment you can still get that kind of work done ...Thus this thing moves sluggishly along, but the main thing is that it moves." (103)

In the time Leppik would spend "nailing together a few sentences", Tamsalu would crank out pages of badly written, imprecise material. These he would submit for approval,

substituting apologies for good editing, while moving on to ever more ambitious projects which were often predicated upon the poorly written work he had just finished. He recognized and tried to correct this fault too late. Thus, Leppik was well known and respected among botanists in the U.S. and Canada, while Tamsalu remains almost totally unknown.

Another unhappy consequence of his failure to properly communicate his findings was that Tamsalu was unable to put forward a cogent defense for the application of Lippmaa's theories and methods in North America. If he had made some effort to polish his manuscripts for publication, he would have been in a better position to promote Lippmaa's ideas and perhaps influence the thinking of other botanists.

Secondly, it was becoming evident even in the 1930s that Tamsalu's strengths were in areas other than theory. H. Trass, another Estonian botanist, commenting in 1961 on Tamsalu's major publication *Sörve taimkate*, noted that the paper was "descriptive first of all", its value lying "in adding new phytocoenological knowledge of Estonian vegetation, in consolidating several of T. Lippmaa's theoretical views with new facts". Trass noted further that the paper almost completely lacked theoretical discussion. In the years that followed, Tamsalu's approach did not change. Other of Lippmaa's students and workers, A. Vaga* for example, went on to develop new theoretical standpoints through their research. But Tamsalu clung tenaciously to every precept Lippmaa had ever expressed. Until the day he died, he did not make even a minor alteration. (59)

Tamsalu's main theoretical initiative was on the nature of plant succession and the climax. To what extent he adapted his ideas from other European scientists is not discernable. But his unorthodox and recusant proposition that there is no such thing as a permanently stable climax community is today vindicated in some circles. Robert L. Smith, in 1974, wrote on the subject of the climax:

> " ...(T)here is considerable question if any such thing exists. True, the late stages in succession are relatively stable; they do exist for some time, and the trend, regardless of whether it started out from xeric or wet sites, is toward a mesophytic condition. But, that succession ends here is not a proved fact. Even in the so-called climax communities, stability is never really achieved. Self-destructive biological changes are continually taking place, even though slowly ... Replacement or recycling of nutrients may be lagging; too much may be tied up in woody vegetation, and the whole metabolism of the community may be slowing down ... What comes after, how slowly or in what direction [changes will occur], only time can tell." (57)

Tamsalu may have had late doubts about his theoretical abilities, but he was absolutely certain that his opinions on the climax were correct. And, he was equally certain, though for somewhat paranoid reasons, that vindication of his ideas would not come during his lifetime. When he first presented his opinion on the climax he wrote to Leppik:

> "I know that here, in front of me, I have a wall several feet thick. Even here [in Canada as in the United States] the personal arrogance of the scientists will not permit them to accept an idea that comes from some newly arrived immigrant ... I'll send copies of my papers to institutions where they will simply be put to gather dust, until someday some bookworm will happen to get interested and discover that, here, someone had written several decades ago that which is presently a new discovery. Should I then feel better lying in my grave?" (91)

Whether he could have made theoretical advances is now immaterial. The value of his work lies in his detailed description of plant communities. Wherever he journeyed, he

*Vaga was a member of Lippmaa's research team who remained in Estonia after 1944.

used the Lippmaa method to record thorough impressions of the vegetation cover. His field books in the RBG archives contain reams of raw data, all of it dated and accurately located, on the Bavarian Alps, the Connecticut forests, and the vegetation of such diverse parts of southern Ontario as Rondeau Park, Muskoka and Sudbury. He has essentially portrayed those areas as they were during the 1950s and late 1940s. His numbering systems indicated 4,328 separate community analyses. Of those, only 200 are missing from the records (all contained in his last German field book, which has never been located). The remaining data can now serve as the basis for future comparisons related to successional change - both natural and man-induced. (130)

At RBG, 270 ecologically discrete collection areas which Tamsalu established and mapped in Cootes Paradise and Hendrie Valley (total area circa 300 hectares) continue to be used in mapping and locating plant populations today. His field books contain up to eight or nine complete analyses taken at different seasons for each of the 270 areas, a fact which surely makes these two properties among the most intensively studied tracts of vegetation in Canada. His vegetation map of Cootes Paradise and his plant lists have already been used comparatively in unpublished studies by the author monitoring changes in the aquatic vegetation of Cootes Paradise.

Tamsalu was not even close to completing his work on the genus *Crataegus*. This study was motivated by the errors and weaknesses he perceived in the major botany manuals. But his late attempt to branch from mere plant identification into monographic work was probably doomed from the beginning - especially since he chose such a confounding group of plants to try to untangle during his last months. To date, no one has satisfactorily solved the conundrum of the hawthorn genus.

On the matter of taxonomy in general, it has been supposed, from examining his herbarium labels, that Tamsalu was a notorious "splitter" - a botanist who tends to classify and sub-classify plants down to the most tenuous details. This, however, was not true. Tamsalu had been advised by his director, Leslie Laking, to use *Gray's Manual of Botany*, Eighth edition, as the final authority for his taxonomic decisions. This edition had been prepared by the dean of "splitters". Prof. M.L. Fernald of Harvard University. Since Tamsalu was both thorough and conscientious, he insisted on following every line of decision, in every key, to the lowest level given in the manual. In so doing, he quickly grew to hate the manual and its editor. As a former agronomist, trained in applied science, Tamsalu believed that plant manuals should be designed for practical use in the field. *Gray's Manual* was certainly not. Fernald's analytical keys often stressed microscopic features while ignoring very obvious field marks. Tamsalu argued that this approach was like trying to distinguish a cat from a cow by counting the hairs on their tails. Hairs, glands and oil tubes, he claimed, belong more to anatomy than morphology; emphasis should be on describing the plant as a whole. And so his ideology collided both with Fernald and the tenets of theoretical botany: "My verdict with respect to Fernald is: Rubbish; students' work! If *Gray's Manual* were a good book, it wouldn't take me so long to identify species..." (85, 91)

He registered many varied complaints in his notebooks but his most vigorous attacks were levelled at what he described as "Fernald's foggy subspecies". *Gray's Manual* contains literally hundreds of varieties and forms, authored by Fernald, which are not found in other manuals. Tamsalu was convinced that many of the so-called "varieties" were delineated merely by artificial boundaries on a continuum, and that some "varieties" were actually pathological, or the result of mechanical injury. One of Tamsalu's most diabolical pranks involved selecting two specimens which could be clearly distinguished as separate varieties according to Fernald. He would then admit that he had collected the specimens from the same clone or even from opposite sides of the same woody plant!

If Fernald were that desperate to claim authorships, Tamsalu often execrated, why didn't he simply give every individual plant its own name? The vindictiveness of these iconoclastic tirades revealed Tamsalu's frustration at being unable to make an impact on North American botany. Despite his emotionalism, his assessments were often valid, and his remarks on such difficult genera as *Viola* have since been paralleled by plant taxonomists. Occasionally he was quite wrong. And this was usually due to his not having seen an adequate cross-section of specimens within what were frequently highly variable taxa. (90, 124)

This failing was a common one for Tamsalu. In his search for "new things", he seemed eager to convert his observations *a posteriori* to sweeping theoretical conclusions, only gradually changing his views with the addition of new data. This impulsiveness has been observed not only by those who have examined his taxonomic remarks, but also in relation to his research. Dr. James Soper wrote with respect to Tamsalu's paper *The Study of South Ontario Vegetation, I. The Flora*: "Apart from his lack of facility with the English language, I was struck by the detailed analysis of the flora that Mr. Tamsalu had attempted to make after such a brief exposure to the vegetation of this region." The fact that the European methods were designed to be time-efficient should deflect some criticism from Tamsalu. But there is also no question that he was very conscious of time and therefore tended to be impetuous. (114)

The author has located information on 40 scientific articles and papers written by Aleksander Tamsalu. That figure does not include the many newspaper and magazine articles which Tamsalu mentioned that he had published but which have never been verified. Nor does it include any of the scores of unpublished manuscripts he wrote while mapping the Estonian vegetation. Of the 40 papers, 24 were written in Estonian, one in Russian, and 15 in English. Nineteen of the papers were published, 15 while he was living in Estonia. None of his English language manuscripts was ever accepted for publication.* Thirty-three of the 40 papers have been located and photocopies with English translations are on file at RBG. Tamsalu's diploma thesis and his "Hiiumaa" and "Saaremaa" manuscripts, are probably in archives at Leningrad and Tartu respectively. The paper on *The Vegetation of Keney Park* may yet be found, but the remaining three works have been lost.

It is unfortunate that Tamsalu did not live long enough to see his Estonian research work recognized in his homeland. He had no reason to believe it would be. Indeed there was evidence to the contrary. During the chaos of World War II, Tamsalu harboured strong fears that much of the knowledge accumulated during the independence period would be lost or suppressed. That belief was reinforced in the late 1950s when he examined *N. Eesti Floora II* (1956), the newly published second volume of the flora of the Estonian S.S.R. Elmar Leppik had drawn to his attention that not a single reference had been made in the volume to the work done during Estonian independence. Was that a reflection on the fate of his own and Lippmaa's phytosociological work? Tamsalu firmly believed so. He believed that all of the unpublished data he and Lippmaa had collected was rotting in the ground near where the Karjasmaa farmhouse had once stood. The farm had long since been demolished, sacrificed for a development; and with it, the research data had disappeared. (43)

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*In September, 1979, the author submitted Tamsalu's paper, *The Study of South Ontario Vegetation; I. The Flora*, to the Ontario Field-Biologist for appraisal. The work was accepted for publication in principle, but contingent upon so much revision and updating that publication may not now be practical.

What Tamsalu never understood was the fact that the phytosociological data published in the Estonian journals had not been "lost or suppressed". Copies of most, if not all, the maps which he and other researchers had made as well as copies of the accompanying manuscripts, remained safely in storage at Tartu. (Presumably his Estonian herbarium specimens also remained there. Exactly how many there were is not certain. He estimated, very roughly, that during his years in Estonia he had collected 15,000 to 20,000 plants and had worked with about 2,000 Estonian species.) (90)

Liivia Laasimer, a student who had joined Lippmaa's research team in 1939, remained in Estonia after the war. Geobotanical studies fell into her hands and for 18 years she pursued them toward completing a "vegetation manual" for Estonia. She finished mapping those areas that had not been done and exhaustively surveyed and reorganized all previous Estonian phytosociological research. The older findings were compared with her own work. In 1965, the long awaited *Eesti N.S.V. Taimkate* (Vegetation cover of the Estonian S.S.R.) was finally published through the Academy of Sciences which had been re-established after the war. In this encyclopaedic single-volume work, Laasimer listed among her copious references all of the phytosociological papers Tamsalu had published between 1933 and 1940. In the foreword, his name was listed among those of the 67 people who had contributed map sheets toward the project. In the accompanying text, Tamsalu was acknowledged, even above Lippmaa and Laasimer, as the chief contributor of such material. This was fitting. Had a vortex of circumstances not swept it out of his grasp, the same project would have become the capstone of his career. (47)

* * *

On Tuesday, February 9, 1960, Aleksander Tamsalu was interred at Woodland Cemetery. A black granite headstone* bears the epitaph: MALESTUS SINUST EI KUSTU IIAL which is loosely translated "you will never be forgotten". A half-kilometre away, at the Royal Botanical Gardens Centre, his memory is indeed permanently enshrined within the walls of the herbarium which houses his massive plant collection.

* See also the photographic supplement added to this biography in 2011

APPENDIX I

THE THEORY AND RESEARCH METHOD OF THEODOR LIPPMAA

Theodor Lippmaa's scientific papers were written mainly in the Estonian and German languages, in journals currently surviving in relatively small numbers. Thus, information on his theory and method has not generally been available in the English language.

The writings of Aleksander Tamsalu are probably the next most reliable source of information on the Lippmaa method. At no time did Tamsalu ever change Lippmaa's method, although he did add a few minor features of his own.

The following was extracted piecemeal from several of Tamsalu's letters and unpublished papers and was arranged in a logical sequence rewritten with some explanatory material added by the author.

A. INTRODUCTION

Plant sociology emerged as an independent branch of science in the first decade of the present century and immediately began a very rapid development. Much work was done by Braun-Blanquet in the study of plant communities, resulting in his publication of *Pflanzensoziologie* which is still used by researchers. Du Riez, Gams, Lüdi, Rübel, Raunkiaer, Schroeter, Clements, Pavillard, Flahault, Brockmann - Jerosh and Markgraf were among the many other important contributors.

Livelier activity took place in the period between the two World Wars when data began accumulating in large quantities and the opinion arose that Braun-Blanquet's theory and methods needed some renovation. Many scientists joined the search for new ideas. Theodor Lippmaa came to prominence when he became Professor of Botany at the University of Tartu, Estonia. A young man, full of energy, he had earlier done much study in the Pyrenees, North Africa, the Alps, the Altai region, Siberia and other places. He organized a staff of a dozen botanists, who received his personal instructions, and started consistent study. In 1933, he published his explanation on the basis of his one-layered plant communities and gave instructions for researching. About the same time he presented his new theory to the International Botanical Congress where at first he met great opposition, especially from the southern European scientists. But soon most of the northern researchers united with him and his theory started to spread. In 1938, he visited the United States where his theory met further attention. Lippmaa was killed during an air raid in January, 1943, and his work was never finished.

B. THE UNISTRATAL CONCEPT OF PLANT COMMUNITIES

How did Lippmaa's theoretical ideas differ from previously held beliefs? The first divergence was his principle of *one-layered* plant communities. According to Tamsalu, Lippmaa wrote: "We will have difficulties in the understanding of plant communities so long as we take them as many-layered, complicated units. We must divide them into separate ones and study each of them separately because *each of these layers is an independent community* with its own qualities and its demands to the habitat. Tiny species of the herbaceous and moss layers are much more tied up with the local factors than the large trees; and they develop in their own directions, often only a few depending upon the tree layers." Consider, for example, that in the small state of Estonia (47,000 sq. km.) the following types of pine forests were catalogued by Tamsalu:

Pinus sylvestris ass. + *Cladonia - Cetraria islandica* ass.
Pinus sylvestris ass. + *Pleumzium schreberi - Hylocomium proliferum* ass.
Pinus sylvestris ass. + *Calluna vulgaris* ass.
Pinus sylvestris ass. + *Vaccinium vitis-idaea - Melampyrum pratense* ass.
Pinus sylvestris ass. + *Vaccinium myrtillus - Maianthemum bifolium* ass.
Pinus sylvestris ass. + *Polytrichum commune* ass.
Pinus sylvestris ass. + *Eriophorum vaginatum* ass. + *Sphagnum*
Pinus sylvestris ass. + *Calluna - Rubus chamaemorus* ass. + *Sphagnum.*

All these were widespread types. Many more local types were discovered on the island of Hiiumaa, extending over many square kilometres, for example:

Pinus sylvestris ass. + *Hepatica triloba - Pulmonaria officinalis* ass.
Pinus sylvestris ass. + *Corylus avellana* ass. +*Sesleria - Filipendula hexapetala* ass.

Which of these is the true *Pinus sylvestris* association? The older theories, which took all the layers as a single community, held these to be independent and different associations. Lippmaa's theory maintained that there is only one *Pinus sylvestris* ass. which associates with many other communities of the shrub, herbaceous and moss layers. Lippmaa called these "complexes of communities".

For two or three years discussions continued on whether to call these one-layered communities, "unions", "societies", or "associations". Lippmaa preferred the word "union", originally proposed by Du Rietz and Gams.

The second divergence in Lippmaa's theory was that he attributed much more importance to local factors and habitat than to the floristic composition. He wrote: "Not every spot where species or groups of species are accumulated is a community; sometimes they have congregated there accidentally. On the other hand, the absence of some characteristic species does not lower that community to the level of an accidental stand, if the habitat and local factors are characteristic of the community. Our exercise is to find out the reasons in each case."

The area in which Lippmaa completely diverged was in the naming of units or associations. To designate a unit, Braun-Blanquet added the suffix "-etum" to the generic root of the characteristic species as follows: Festuc*etum* rubrae for *Festuca rubra*, Carlc*etum* paniceae for *Carex panicea,* or Pin*etum* sylvestris for *Pinus sylvestris.* Lippmaa took one or two (very seldom three) names of the species most characteristic of the community, separating them with a dash (-), and adding the word association, or its abbreviation "ass.", without actually changing the Latin names: *Pinus sylvestris* ass.", *Hepatica triloba - Pulmonaria officinalis* ass." For the variants or "fades" he took a third name, the name of the species characteristic for the fades; for example, "*Hepatica -Pulmonaria* ass., *Asperula ordorata* fades". (Note that in units where any given genus was represented by only one sub-generic taxon, it was necessary to use only the generic name). Lippmaa's system was simpler, especially with respect to association names where more than one species was involved. What Lippmaa designated as "*Lychnis flos cuculea* -M*yosotis palustris* ass.", Braun-Blanquet called "*Lychnetum flos cuculi - Myosotetum palustriae*". This created such a confusion one could scarcely find the names of the plants in it. Similarly Braun-Blanquet used the suffix "-alia" to denote that which Lippmaa referred to as a "complex". Lippmaa's form in this respect was as follows: "*Ulmus-Acer-Tilia + Corylus avellana + Hepatica triloba - Pulmonaria officinalis + Rhytidiadelphus triquetrus-Hylocomium proliferum* ass. complex". This accounted for

the whole cover from trees, through shrubs and herbs to the moss layer. Although this was an improvement over Braun-Blanquet, it too was unquestionably cumbersome, and this problem remained unresolved. Under some circumstances Lippmaa abbreviated by using the name of the dominant layer, such as *Ulmus—Acer - Tilia* ass. in the above case, but this was not always possible on every occasion.

C. THE RESEARCH METHOD OF THEODOR LIPPMAA

At one time objective or random methods of vegetation analysis were generally recommended - techniques such as following a randomly established transect line, or throwing a wooden frame (quadrat) over one's shoulder and describing the vegetation it enclosed. The Weber method, which Tamsalu had also used, was the most precisely mathematical of those methods which he knew. There was little or no subjectivity involved. In a randomly placed 1 square meter quadrat, divided into 100 square decimeters, Weber would note the presence or absence of each species in each of the 100 segments. The results were expressed as percentages. The problem with this method was that it did not distinguish between several small plants and a few large plants, regardless of cover value. Five tiny plants appearing in five squares would get the same rating as one large plant completely filling five squares. With Weber's method, any distinction disappeared. In Estonia, researchers at the Tooma Research Station used the Weber method exclusively, but they were involved only with sown wheat fields. The method was appropriate for crop meadows with a uniform vegetation. Yet when one dealt with natural or spontaneous plant communities, it was clear that a high percentage of vegetation belonged to transitional zones and it made little sense to complicate a study by overloading the results with "ballast" data except, for example, in special gradient studies. This was the reason why Lippmaa did not approve of these "blind methods", as he called them. He recommended a subjective and very careful selection of sample plots representative of the floristic composition of the unit or complex under scrutiny, and he demanded that a researcher must be able to select characteristic plots consistently before permitting him to undertake general studies.

Lippmaa used different sizes of sample plots depending on such characteristics of the community as homogeneity and number of species present. After experimenting with various plot sizes, the following sizes were commonly used:

Forest communities, tree layer: 1000 square meters.

Forest communities, floor cover: 100 square meters.

Meadow communities: 20 square meters (samples of 5, 10 or 14 square meters were acceptable if only a few species were present).

Swamp communities: 10 square meters (samples of 2 or 4 square meters were acceptable if there were only a few species).

In cases where the normal sample size unavoidably included an element of distinctly strange or atypical vegetation, Lippmaa recommended making the sample plot smaller, while retaining its characteristic nature.

Data collected from the sample plot was eventually organized and tabulated. For an overview of the types of measurements made, the reader is referred to Tables 1, 2 and 3. These tables indicate the format, grouping and positioning as they were used by the Lippmaa research team. The table headings up to the plant lists Tamsalu developed him-

TABLE 1 - RED CEDAR IN HARDWOODS

Juniperus virginiana - Quercus velutina + Juniperus communis.

Dry gravelly hill		Haddam, Connecticut, September 9, 1951					
	No. of analysis	549	550	551	552	553	554
	Site	Slope 2° W	Slope 5° W	Slope 2° W	Terrace level.	Slope 3° W	Terrace level.
	Soil	Gravelly, stony.	Gravelly, stony.	Gravelly, stones.	Sandy.	Sandy.	Sandy.
	Moisture.....	Moist.	Medium.	Dry.	Dry.	Dry.	Dry.
	A. Tree Layer:						
	Density of stand	3+	4-	4-	4+	3-	4
	Height of stand(feet).	25	35-40	20-25	35-40	40	35-40
	Percentage of conifers	25	50	40	40	20	20
1.	*Juniperus virginiana*...	2.1	3.1-2	3.1	3.1	2.1	2.1
2.	*Quercus velutina*	2.1	2.1	3.1	3.1	2.1	3.1
3.	*Betula populifolia*...	2.1-2	2.1	2.1	1.1	2.1	2.1
4.	*Carpinus caroliniana*	3.1	2.1	2.1	1.1	+.1	+.1
5.	*Hicoria ovata*	1.1	1.1	+.1	-	+.1	+.1
6.	*Betula lenta*	-	-	-	+.1	2.1	3.1
7.	*Fraxinus americana*...	-	-	+.1	-	-	-
8.	*Cornus florida*	-	-	+.1	-	-	-
	B. Understory:						
	Density of stand.....	3	3+	4-	4	4+	3
	Height of stand(feet).	4-7	4-7	4-7	4	7	4-7
	a.Seedlings and Saplings:						
1.	*Juniperus virginiana*...	1.1	1.2	1.1	1.1	1.1	+.1
2.	*Quercus velutina*	-	-	-	-	1.1	1.1
3.	*Hicoria ovata*	+.1	1.1	2.1	+.1	1.1	1.1
4	*Acer rubrum*.....	1.1	1.1	1.1	+.1	-	1.1
5.	*Fraxinus americana*..	-	-	-	1.1	+.1	-
6.	*Carpinus caroliniana*..	1.1	2.1	1.1	-	-	-
7.	*Castanea dentata*.....	-	-	-	-	-	+.1
	b. Shrubs:						
1.	*Juniperus communis*	3.3	2.2	3.2	3.2-3	4.3	2.2
2.	*Viburnum acerifolium*	2.2	1.2	1.2	1.2	+.2	1.2
3.	*Vaccinium vacillans*	1.2	-	+.2	1.2	1.2	1.2
4.	*Kalmia latifolia*,young	1.2	1.1	-	-	+.1	+.1
5.	*Comptonia peregrina*	-	-	-	+.1	1.2	1.2
6.	*Rhus copallina*	-	-	+.1	-	-	-
7.	*Hamamelis virginiana*	-	-	-	-	-	1.2
8.	*Rosa virginiana*	-	-	-	-	-	+.2

TABLE 1 - RED CEDAR IN HARDWOODS (Continued)

Juniperus virginiana - Quercus velutina + Juniperus communis.

Dry gravelly hill	Haddam, Connecticut, September 9, 1951					
No. of analysis	549	550	551	552	553	554
Site	Slope 2° W	Slope 5° W	Slope 2° W	Terrace level.	Slope 3° W	Terrace level.
Soil	gravelly, stony.	gravelly, stony.	Gravelly, stones.	Sandy,	Sandy,	Sandy.
Moisture	Moist.	Medium	Dry.	Dry.	Dry.	Dry.
c. Herbaceous layer:						
Density of stand	3-	2+	3+	3	1	1
1. *Solidago rigida*	2.1	1.1	1.1	1.1	+.1	+.1
2. *Solidago squarrosa*	+.1	1.1	+.1	+.1	+.1	1.1
3. *Solidago juncea*	-	-	-	+.2	+.2	+.2
4. *Toxicodendron radicans*	1.3	1.3	1.2	+.1	2.3	+.1
5. *Agrostis perennans*	1.2	2.2	2.2	2.2	1.2	1.2
6. *Carex flexuosa*	1.2	1.2	1.2	1.2	+.2	+.2
7. *Jonactis linariifolius*	+.1	+.2	+.2	+.2	-	-
8. *Veronica officinalis*	+.1	1.2	2.2	1.2	+.2	+.2
9. *Rubus triflorus*	3.2-3	2.2	+.1	-	-	-
10. *Chimaphila maculata*	-	+.1	+.1	+.1	+.1	-
11. *Oxalis stricta*	+.1	+.1	+.1	-	-	-
12. *Lycopodium obscurum*	2.3	-	-	+.2	-	-
13. *Aster divaricatus*	+.1	+.1	-	-	-	-
14. *Parthenocissus quinquefol.*	-	-	1.2	1.2	-	-
15. *Solidago caesia*	-	-	+.1	+.1	+.1	+.1
16. *Galium circaezans*	-	-	1.2	+.2	+.1	+.1
17. *Panicum sphaerocarpon*	-	-	-	+.2	-	+.1
18. *Achillea millefolium*	1.2	+.2	1.2	1.2	+.2	+.2
19. *Fragaria virginiana*	+.1	+.2	2.3	1.2	+.2	+.2
20. *Galium mollugo*	-	+.1	1.2	+.1	+.1	+.1
21. *Brunella vulgaris*	-	-	2.1	1.1	+.1	+.1
22. *Potentilla canadensis*	-	-	-	+.1	+.1	+.1
23. *Rumex acetosella*	-	-	-	+.1	-	+.1
24. *Verbascum Thapsus*	-	-	+.2	-	-	-
25. *Lycopodium complanatum*	-	-	-	3.3	-	-
26. *Aster patens*	-	-	-	+.1	-	-
27. *Rubus strigosus*	-	-	-	-	1.2	-

Explanations:

The sites of the analyses were located on the western slope of the ridge and they have been taken progressively from the lower part of the ridge toward the top.

The neighboring stands are: on lower part of the ridge, dense young thicket; on top of the ridge, old hardwood (mostly oaks).

The soil on lower part is mixed with stones; on top and nearby it is mostly sand on gravel.

TABLE 2 - HARDWOOD ON COOL SPRINGY SLOPES AND BANKS OF BROOKS

Betula lutea - Carpinus caroliniana + Kalmia latifolia + Lycopodium complanatum

Haddam, Spring Valley, Connecticut, September 9, 1951

	Mature stand on springy slopes						30 - 40 year old stand on nearby abandoned field					
No. of analysis	537	538	539	540	541	542	543	544	545	546	547	548
A. Tree Layer:												
Density of stand	3	3-	3+	3-	3-	3+	4	4-	4	4-	4-	4
Height of stand(feet)	35	40	70	30/55	30/60	30/60	30	40	30	40	35	40
1. *Acer rubrum*	2.1	2.1	2.1	3.1	3.1	3.1	1.1	4.1	1.1	2.1	3.1	3.1
2. *Carpinus caroliniana*	3.1	3.1	2.1	3.1	3.1	2.1	2.1	1.1	4.1	3.1	3.1	3.1
3. *Betula lutea*	2.1	+.1	+.1	2.1	+.1	+.1	-	-	-	-	-	-
4. *Betula lenta*	+.1	2.1	1.1	+.1	1.1	1.1	-	-	-	-	-	-
5. *Quercus macrocarpa* .	1.1	1.1	+.1	-	-	+.1	-	-	-	-	-	-
6. *Quercus alba*	-	1.1	3.1	+.1	+.1	-	4.1	1.1	1.1	3.1	+.1	2.1
7. *Quercus coccinea* ...	-	-	1.1	-	-	+.1	1.1	+.1	-	-	-	-
8. *Quercus borealis*	-	-	-	-	-	-	1.1	+.1	+.1	1.1	-	1.1
9. *Betula populifolia* ..	-	+.1	-	-	+.1	+.1	1.1	2.1	2.1	1.1	2.1	1.1
10. *Tsuga canadensis*	-	-	-	-	-	+.1	-	-	-	-	-	-
11. *Juniperus virginiana*	-	-	-	-	-	-	+.1	1.1	1.1	+.1	-	-
12. *Hicoria ovata*	-	-	-	-	-	-	-	-	-	+.1	-	+.1
13. *Fraxinus americana* .	-	-	-	-	-	-	-	-	-	-	-	+.1
B. Understory:												
Density of stand..	3	3	3+	4-	4+	4-	2	2	1	1	1	1
Height of stand(feet)	7	7	7	7	7	7	5	3	2	2	2	2

a. Seedlings and Saplings:

1.	*Acer rubrum*	-	-	-	-	-	-	1.1	1.1	+.1	+.1	+.1	+.1
1.	*Carpinus caroliniana*	1.1	1.1	3.2	2.1	2.1	1.1	-	-	-	-	-	-
3.	*Betula lutea*	+.1	+.1	+.1	+.1	1.1	1.1	-	-	-	-	-	-
4.	*Quercus macrocarpa.*	1.1	1.1	-	-	-	+.1	-	-	-	-	-	-
5.	*Quercus alba*	-	-	-	1.1	1.1	1.1	1.1	+.1	+.1	2.1	1.1	1.1
6.	*Hicoria ovata*	-	-	-	+.1	-	-	+.1	-	+.1	-	-	-
7.	*Castanea dentata*	+.1	+.1	+.1	+.1	+.1	+.1	+.1	+.1	+.1	+.1	-	-
8.	*Fraxinus americana* ..	+.1	+.1	-	-	-	-	-	-	-	-	-	-
9.	*Sassafras Sassafras*.....	+.1	+.1	+.1	+.1	+.1	+.1	-	-	-	-	-	-
10.	*Cornus florida*	-	-	-	1.1	+.1	+.1	-	-	-	-	-	-
11.	*Tsuga canadensis*	-	-	-	-	-	+.1	-	-	-	-	-	-
12.	*Tilia americana*	-	-	-	-	-	-	+.1	-	-	-	-	-
13.	*Ulmus americana*	-	-	-	-	-	-	-	2.1	-	-	-	-

b. Shrubs

1.	*Kalmia latifolia*	3.3	3.3	2.2	4.3	4.3	4.3	1.2	-	1.3	1.2	1.2	1.2
2.	*Viburnum acerifolium* .	1.2	+.2	1.2	1.2	1.2	1.2	-	-	-	-	-	-
3.	*Vaccinium vacillans*	1.2	1.2	2.2	-	2.3	+.2	-	-	-	1.2	-	1.2
4.	*Juniperus communis*.....	-	1.2	+.2	-	+.2	1.2	-	-	-	-	-	-
5.	*Azalea nudiflora*	+.1	1.1	+.2	+.2	+.2	1.2	-	-	-	-	-	-
6.	*Padus nana*	-	-	-	+.2	+.2	-	+.2	2.2	-	-	+.1	-
7.	*Hamamelis virginiana* ..	-	-	-	-	-	-	+.1	-	-	-	+.1	+.1

	C. Herbaceous layer:												
	Density of stand	3+	3	3-	2+	3-	3-	4-	3+	4-	3-	3+	3+
	Height of stand(inches)	6	8	6	4	5	4	8	14	8	8	14	8
1.	*Lycopodium complanatum*	4.2-3	3.2-3	3.3	3.3	4.2-3	3.3	+.2	-	-	-	3.2	3.3
2.	*Lycopodium obscurum*	1.2	2.2	2.2	1.2	1.2	1.2	2.3	+.2	-	-	1.2	1.2
3.	*Rubus triflorus*	1.2	2.2	2.2	2.2	2.2	+.2	1.2	2.2	1.2	2.2	2.2	2.2

TABLE 2 - HARDWOOD ON COOL SPRINGY SLOPES AND BANKS OF BROOKS - Continued

No. of analysis	537	538	539	540	541	542	543	544	545	546	547	548
4. *Dryopteris marginalis*	1.2	2.2	+.2	2.2	+.2	2.2	1.2	3.3	+.2	2.3	4.3	2.2
5. *Polystichum acrostichoid*	+.2	1.2	-	1.2	-	1.2	-	-	+.2	-	-	-
6. *Pyrola americana*	+.1	+.1	1.1	1.1	1.1	+.2	1.1	1.1	1.1	1.1	+.1	1.1
7. *Peramium pubescens*..	+.1	-	-	+.1	+.2	+.2	-	-	-	-	-	-
8. *Chimaphila umbellata*	+.1	-	-	+.1	1.1	+.1	-	-	-	-	-	-
9. *Aralia nudicaulis*	-	+.1	1.1	-	1.1	-	-	-	-	-	-	-
10. *Smilax rotundifolia* ...	+.2	+.2	+.2	-	+.2	-	-	-	-	-	-	-
11. *Maianthemum canadense*	1.1	1.1	+.1	1.1	+.1	+.1	-	1.1	+.1	1.1	-	+.1
12. *Uvularia sessilifolia*	1.1	+.1	1.1	1.1	1.1	+.1	+.1	+.1	+.1	2.1	+.1	2.1
13. *Monotropa uniflora*	+.1	+.1	+.1	-	-	1.1	-	-	-	-	-	-
14. *Lysimachia quadrifolia*	-	+.1	-	-	+.1	+.1	-	+.1	+.1	+.1	+.1	+.1
15. *Solidago canadensis*....	+.1	-	+.1	+.1	+.1	-	-	1.1	+.1	+.1	-	-
16. *Solidago caesia*	-	+.1	+.1	+.1	+.1	+.1	-	-	-	-	-	-
17. *Fissipes acaule*	-	-	-	-	-	-	+.2	-	+.2	+.2	-	-
18. *Carex flexuosa*	+.2	+.2	+.2	+.2	-	-	-	-	-	-	-	-
19. *Danthonia spicata*....	+.2	1.2	2.3	+.1	2.2	+.2	-	-	-	-	-	-
20. *Muhlenbergia tenuiflora*	-	1.2	1.2	-	+.2	-	-	-	-	-	-	-
21. *Agrostis perennans*...	-	-	-	-	-	-	4.3	2.1	4.3	3.1	+.1	1.1
22. *Calamagrostis cinnoides*	-	-	-	-	-	-	1.1	1.1	+.1	+.1	-	-
23. *Osmunda Claytoniana*	2.2	-	-	1.2	-	-	-	1.2	-	-	2.2	+.2
24. *Dryopteris Boottii*	1.2	+.2	-	+.2	-	-	-	-	-	-	-	-
25. *Dryopteris Dryopteris*	-	-	-	-	1.1	-	-	-	-	-	-	-
26. *Viola eriocarpa*	+.1	+.1	-	+.1	+.1	-	-	-	-	-	-	-
27. *Lycopodium clavatum*	2.2	+.2	-	1.2	+.2	-	+.2	-	-	-	-	-
28. *Lycopodium lucidulum*	-	-	-	-	-	-	-	-	+.2	-	-	-
29. *Vitis labrusca*	-	+.2	-	-	-	-	-	-	-	-	-	-
30. *Actaea alba*	-	-	-	+.1	-	-	-	-	-	-	-	-
31. *Mitchella repens*	-	-	-	-	-	-	-	-	2.3	+.1	-	-

Explanation:

The first group was located on the damp cool springy bank of a brook.

Anal. 537 - Slope 10° S, soil sandy loam, moist.
Anal. 538 - Slope 10° S, soil containing rocks, drier.
Anal. 539 - Slope 15° SE, soil sandy loam with stones, moisture medium. Old stand.
Anal. 540 - Low bank of the brook, soil sandy loam, moist.
Anal. 541 - Slope 15° SSE, soil deep raw humus containing medium moisture.
Anal. 542 - Slope 5° S, soil stony, medium moisture. Thicket.

The second group was in an abandoned field about 250 - 300 yards south of the above. Soil: sandy loam with stones. The site was surrounded by stone fence. The stand was 30 - 40 years old.

TABLE 3 - *FESTUCA RUBRA* ASS. IN THE BAVARIAN ALPS

	Wetterstein limestone				Oberstdorf Lyas				
	Herzog-stand.	Schachen.		Hoch-alm.	Unteralm		Schlap-pold.	Linkers-alm	
Altitude, meters.	1 500	1 600	1 800	1 900	1 500	1 600	1 800	1 800	
No. of analysis	88	193	216	601	401	403	408	455	Average
Date of analysis	7.4.46	7.30.46	8.1.46	9.8.48	7.9.47	7.9.47	7.10.47	7.27.47	altitude
Soil	Calca-reous.	Stoney loam	Calca-reous.	Calca-reous.	Sandy loam.	Sandy loam.	Clayey loam.	Podzol-ized.	limit in meters
Density of stand	4	4	3	4	5	4	4	5	
Height of stand (cm)	10	10	10	10	20	10	20	10	
1. *Festuca rubra*	1.1	1.1	+.1	+.1	1.1	1.1	2.1	1.1	2 000
First group, persistent species:									
2. *Deschampsia caespitosa*	+.1	+.1	2.1	2.3	1.1	2.1	1.1	2.1	2 200
3. *Trifolium pratense* ...	+.1	+.1	+.1	+.1	2.1-3	2.1	1.1	2.1	2 270
4. *Trifolium repens*.....	-	-	-	+.1	1.1-3	+.1	1.3	+.1	1 910
5. *Lotus corniculatus*	1.1-2	2.3	+.2	+.2	+.2	+.1	+.2	1.2	1 980
6. *Ranunculus aeris*	1.1	+.1	-	+.1	1.1-3	+.1	2.1	-	2 400
7. *Alchimilla pubescens*	+.2	1.2	+.2	+.2	2.2	1.2	1.2	-	2 270
8. *Festuca ovina*	+.1	1.1	+.1	1.1	+.1	+.1	-	+.1	2 000
Second group, the species that disappear:									
9. *Poa pratensis*	+.1	+.1	-	-	2.1	1.1	-	-	1 860
10. *Plantago lanceolata*..	1.2	+.2	-	+.2	1.2	1.2	-	-	1 860
11. *Leontodon autumnalis*	1.2	1.2	+.2	-	+.2	+.2	+.2	-	1 850
12. *Chrysanthemum leucanth.*	+.1	1.1	-	-	+.1	+.1	+.1	-	2 240
13. *Centaurea jacea*	-	+.1	-	-	+.1	+.1	-	-	1 860
14. *Agrostis alba*	+.1	-	-	-	2.1	1.1	-	-	1 860

	Third group, replaces the second group									
15.	*Poa alpina, v. vivipara*	-	-	1.1	1.1	-	-	+.1	+.1	2 580
16.	*Plantago alpina .....*	-	-	-	+.1	-	-	+.1	1.1	2 300
17.	*Leontodon pyrenaicus*	-	-	-	1.2	-	-	+.2	1.2	2 350
18.	*Potentilla aurea .....*	-	-	1.2	1.2	-	-	+.2	+.2	2 280
19.	*Agrostis rupestris*	-	1.1	-	+.1	-	-	-	2.1	2 300
20.	*Ligusticum Mutellina*	-	-	+.2	1.2	-	-	-	1.2	2 340
21.	*Galium alpestre .....*	-	+.2	+.2	+.2	-	-	+.2	+.2	2 300
22.	*Campanula Scheuchzeri*	+.1	+.1	+.1	+.1	+.1	+.1	+.1	+.1	2 420
23.	*Ranunculus montanus*	1.1	+.1	+.1	+.1	-	+.1	+.1	1.1	2 400
24.	*Phleum alpinum .....*	-	-	-	1.3	†.1	+.1	+.1	1.1	2 370
25.	*Alchimilla alpina.....*	+.2	+.2	1.2-3	2.2-3	-	+.2	1.2	1.2-3	2 300
	Local species:									
26.	*Arnica montana.....*	-	-	-	-	-	-	2.2	1.2	2 070
27.	*Gentiana lutea .....*	-	-	-	-	-	-	1.1	1.1	2 110
28.	*Campanula barbata..*	-	-	-	-	-	+.1	+.1	+.1	2 300
29.	*Festuca pulchella ...*	-	-	-	-	-	+.1	+.1	1.1	2 240
30.	*Trifolium badium ...*	-	-	-	-	-	-	+.1	1.1	2 100
31.	*Alchimilla glaberrima*	-	-	-	-	-	-	+.2	+.2	2 300
	Indifferent species:									
32.	*Euphrasia Rostkoviana*	+.1	+.1	+.1	+.1	+.1	+.1	-	-	2 300
33.	*Polygonum viviparum*	+.1	-	+.1	+.1	-	-	+.1	+.1	2 570
34.	*Selaginella selaginides*	+.1	+.1	+.1	+.1	-	-	-	-	2 340
35.	*Parnassia palustria*	-	+.1	+.1	+.1	-	-	+.1	+.1	2 320
36.	*Bellis perennis .....*	1.1-3	+.2	-	+.2	+.2	+.2	+.2	-	1 860
37.	*Prunella vulgaris*	1.1	+.1	+.1	1.1	1.1-3	+.1	+.1	+.1	1 860
38.	*Linum catharticum*	+.1	+.1	-	-	-	-	-	-	2 040
39.	*Potentilla tormentilla*	1.2-3	2.1-2	+.1	-	+.1	+.1	+.1	-	2 200
	Accidental & Strange species:									
40.	*Homogyne alpina....*	-	+.2	+.2	+.2	-	-	-	+.2	2 300
41.	*Hieracium Hoppeanum*	-	-	1.2	1.2	+.2	+.2	-	-	2 000
42.	*Veratrum album .....*	-	-	+.1	-	-	+.1	1.1	-	2 070

TABLE 3 - *FESTUCA RUBRA* ASS. IN THE BAVARIAN ALPS - Continued

	Density of stand	4	4	3	4	5	4	4	5	
	Height of stand (cm)	10	10	10	10	20	10	20	10	
43.	*Cirsium spinosissimum*	-	-	-	+.2	-	-	+.2	+.2	2 020
44.	*Biscutella levigata*	+.1	-	-	+.1	-	-	-	-	2 240
45.	*Thymus serpyllum...*	1.3	2.3	-	-	+.2	-	-	+.2	2 530
46.	*Astrantia major .....*	-	+.2	-	-	+.2	+.2	-	-	1 750
47.	*Plantago major .....*	+.2	+.2	-	-	+.2	+.2	-	-	1 860
48.	*Primula officinalis*	+.2	+.2	+.2	-	-	-	-	-	1 700
49.	*Carum carvi .....*	+.1	-	-	-	+.1	+.1	-	-	1 800
50.	*Dactylis glomerata*	+.1	-	-	-	+.1	-	-	-	1 860
51.	*Trollius europaeus*	-	-	+.1	-	+.1	1.1	+.1	-	2 330
52.	*Nardus stricta .....*	-	-	-	-	-	-	1.2	+.2	2 590
53.	*Bellidiastrum Michelii*	-	-	-	1.2	-	-	+.2	+.2	2 280

Additions to Table 3.

Anal. 88 - Herzogstand, at the end of Pioner Weg, below the north side of cliff, level. **Additions to the table** under *Accidental and Strange species:*

Poa trivialis (+.1) *Galium mollugo* (1.3) *Campanula rotundifolia* (+.1)
Briza media (+.1) *Veronica chamaedrys* (+.1) *Geranium Robertianum* (+.1)
Pimpinella magna (+.2) *Silene inflata* (+.1) *Ajuga pyramidalis* (+.1)
Carex sempervirens (+.1) *Phyteuma orbiculare* (+.1).

Anal. 193 - Schachen, alpine meadow; single fir trees; south slope 20°; grazed.
Additions to the table:

Carlina acaulis (+.2) *Gentiana Kochiana* (+.1) *Carex glauca* (1.1)
Carex muricata (2.1).

Anal. 216 - Schachen, pasture, thin fir trees; stoney plain.
Additions to the table:

Sesleria coerulea (+.1) *Anthoxanthum odoratum* (1.1)
Luzula flavescens (+.1) *Luzula campestris* (+.1) *Adenostyles albifrons* (1.2)
Anthyllis vulneraria (+.2) *Tofieldia calyculata* (+.2) *Phyteuma spicatum* (+.1)
Carex sempervirens (+.1) *Carex capillaris* (+.1) *Carex atrata* (+.1)

Anal. 601 - Hochalm, at the foot of Alpspitze; uneven.
Additions to the table:

Crepis aurea (1.2) *Gentiana aspera* (+.1) *Potentilla Brauneana* (+.2)
Carex firma (+.2) *Anthyliis vulneraria* (+.2) *Achillea millefolium* (+.2)
Cerastium caespitosum (+.1)
Tofieldia calyculata (+.1)

Anal. 401 - Unteralm (Schlappold), S.E. slope 30°.

Anal. 403 - Unteralm, near the winterbarn, level, plain, moist.

Additions to both analyses respectively:

Sieglingia decumbens (+.1, +.1) *Fragaria vesca* (+.2, +.2)
Menta arvensis (+.1, +.1) *Lysimachia vulgaris* (+.1, +.1)

Anal. 403 only:

Rhinanthus minor (+.1) *Cirsium palustre* (+.2) *Rumex acetosa* (+.1)
Rumex alpinus (+.2) *Hippocrepis comosa* (+.1) *Senecio alpinus* (+.2)
Phyteuma hemisphaericum (+.1) *Aconitum napellus* (+.1)
Achillea macrophylla (+.2) *Equisetum arvense* (+.1).

Anal. 408 - Schlappold, between lake and barn; east slope 20°, moist.
Additions to the table:

Taraxacum officinale (+.2) *Rumex acetosa* (+.1) *Luzula campestris* (+.1)
Geum rivale (+.1) *Carduus acaulis* (+.2) *Rumex alpinus* (+.2)
Aconitum napellus (+.1) *Phyteuma hemisphaericum* (+.1)
Gentiana punctata (1.1) *Epilobium alpinum* (+.1) *Crepis aurea* (1.2)
Hieracium alpinum (+.2) *Hieracium aurantiacum* (1.2) *Hieracium rubellum* (+.2)
Geum montanum (+.2)

Anal. 455 - Linkersalm; west slope 20°, sheep pasture.
Additions to the table:

Oxytropis montana (+.2) *Crepis aurea* (1.2) *Hieracium aurantiacum* (+.2)
Gnaphalium supinum (+.1) *Euphrasia minima* (+.1) *Myosotis alpestris* (+.1)
Gentiana brachyphylla (+.1) *Aster alpinus* (+.2) *Chrysanthemum atratum* (+.2)
Taraxacum alpinum (+.2) *Galium helveticum* (+.2) *Gentiana purpurea* (+.1)
Festuca pumila (+.1).

self, but they were also adopted by Lippmaa. (Braun-Blanquet began his tables with the species list and relegated other analytical information into the written text). The tables show that for most analysis and tabulation, four vegetation layers were commonly recognized by Lippmaa:

i) Tree layer (e.g. *Ulmus - Acer - Tilia* ass.)

ii) Shrub layer (e.g. *Corylus aveliana* ass.)

iii) Herbaceous layer (e.g. *Hepatica triloba - Pulmonaria officinalis* ass.)

iv) Moss layer (e.g. *Rhytidiadelphus triquetrus - Hylocomium proliferum* ass.)

In very thorough studies, a fifth "layer" was included for lichens if such were represented. They were not so often found on the forest floor, but more frequently on trees. To deal with them, one had to make a separate table dividing the species as to their habitat preferences and other factors,- for example: "hanging from branches", "on branches", or "on stumps".

Even a cursory examination of these tables, especially Table 3, will reveal that the species lists for any of the above mentioned strata could be further subdivided as conditions dictated in order to impose additional organization on the data. There were unlimited ways of dividing species but it was a common practice to use the following categories when the data was sufficiently detailed and complete that such a classification could be made with confidence:

Characteristic species were those species typical or indicative of a given community.

Companion species were species that appeared by accident in a given unit but were "characteristic" in a neighbouring unit. There was sometimes a considerable number of companion species in an analysis, in addition to those which were characteristic.

Strange or accidental species were those not typical of a given community but existing there as pioneers in the next stage of succession, remnants of a former community, or merely by an accident of dispersion.

Indifferent species were those considered to have a broad ecological amplitude. In the Alps, *Selaginella selaginoides* is such a species. It appears in forests, thickets or fields, wherever there is moisture. Also, *Plantago major*, *Rumex actosella* and other species are not characteristic of any types of association, but may conceivably appear in almost any meadow unit.

The category to which a species was assigned had to be determined after prolonged observation on the part of the researcher. Such classification was not usually possible after merely a preliminary study.

For the whole association complex, the following factors were noted: habitat (slope and aspect), soil, and moisture. In orientation works (preliminary studies) general descriptions were considered acceptable. For detailed studies, accurate measurements of such qualities as soil texture, depth and pH were normally taken.

Then the following three estimates were made for each stratum or layer:

Density of stand (or general density)

Height of stand

Abundance-sociability estimate for each species.

The rules for making these estimates were specific, and are herein outlined in detail:

I. Density of stand

During his life, Tamsalu made several thousand analyses, but he admitted that every spring when he resumed field work (or when he had to catalogue on the spot the abundance-sociability for an unfamiliar vegetation type,) then at first he tended to over- or under-evaluate. For that reason he always began with a general density evaluation for the density of the whole stratum. "Density of stand" was his own measurement, which he used for 25 years in the study of grasslands. It indicated the intensity or grade of cover for the entire species composition of the layer being analyzed. The measurement had some similarity to that used by Scandinavian researchers and northern foresters, but it was not exactly the same. It was based on a five-part scale, each step representing 20 percent of the entire cover: 1=20%; 2=40%; 3=60%; 4=80%; 5=100%. The signs "+" and "-"indicated "more" and "less" respectively. For example, 3+ would mean about 65%. An evaluation of 5 seldom occurs in nature. Usually the estimate would be between 3 and 4.

Once Tamsalu had established the general density rating, he knew the maximum abundance-sociability estimate he could assign to each species in the plot.

II. Height of stand

The height of the stand was measured three or four times and an average was taken. Distinctly two-leveled stands, as are often found within tree canopies, were expressed as two heights separated by a slash (e.g. 12/20 indicating a lower level averaging 12 m. and an upper level averaging 20 m). Uneven stands without distinct layering were tabulated as a lower and upper estimate separated by a hyphen (e.g. 10-15, or 1-6).

III. Abundance-sociability estimates

For each species in the sample plot, the researcher evaluated its condition of growth and presented the evaluation abbreviated as two symbols (numbers) separated by a "mark" or period(.), thus: *Poa pratensis* 3.1; Taraxacum *officinale* + .1; etc. The symbols were chosen from two scales of evaluation.

The first or abundance symbol was chosen from a six-point scale and was interpreted about the same as Braun-Blanquet's "total estimate" (abundance +dominance). The six-point scale was as follows:

+ Plants growing singly, or very small plants more abundantly but with negligible cover value. (Some researchers took this to mean cover less than 1/32 of the sample plot).

1. Large plants growing sparsely, or smaller plants more plentiful but covering less than 1/2oof the sample plot (1-5%).

2. Numerous, covering 1/20- % (5 to 25%) of the plot.

3. Numerous, covering % - 1/2 (25 to 50%) of the plot.

4. Very numerous, covering 1/2 to % (50 to 75%) of the plot.

5. Dominant, covering % - all (75 to 100%) of the plot; mostly in pure stands.

The second or sociability symbol indicated the manner of growth, that is sociability or gregariousness as used by Braun-Blanquet. This was chosen from a five-point scale:

1. Growing singly similar to trees; one stemmed plants.

2. Grouped or tufted species; multi-stemmed plants such as shrubs; species with large rosettes like *Hieraceum* and *Taraxacum*.

3. In troops, small patches or cushions such as *Thymus*; or grouped into one section of the sample plot.

4. Growing in colonies, extensive patches or carpets (in cases of cover greater than 1/2 of the sample plot). This could mean plants sometimes congregating in a single segment of the plot as, for example, *Rhus* or *Hamamelis*, indicating heterogeneity in the total sample.

5. Forming large, dense colonies, or pure stands (usually in cases where one species covers more than % of the sample plot).

For the estimate of sociability, Lippmaa often used hyphenated symbols such as 1-3 or 2-3. The use of such a device always indicated heterogeneity within the sample plot. Thus 1-3, as the sociability symbol, would mean that the species was growing singly in some parts of the plot and grouped in others; and 2-3 would be interpreted as a tufted species growing in single tufts as well as in groups in the same plot.

How did the "density of stand" or "general density" evaluation relate to the abundance-sociability estimates for the species within the stratum? Tamsalu recorded specific rules only for the two most commonly assigned general density estimates, viz. 3 and 4:

If the general density of a stratum were 4 (more or less), then an abundance estimate of 5 for any species in that stratum could only be assigned for pure groupings; for any other situation in which the general density of 4 was used, the maximum possible abundance estimate for any species was 4. If the general density were assessed around 3, then an abundance estimate of 4 was the maximum which could be used for pure stands of one species, and in all other cases where such a general density was assigned, the maximum possible abundance estimate for any species was 3.

Theoretically there were 30 possible combinations of abundance-sociability estimates. Each combination contained within it certain implications, some of which were not immediately evident. These implications are described below:

i) Abundance evaluations:

The abundance estimate of 5:

The evaluation 5.5 indicated a [virtually] "pure stand" wherein other species were represented only by abundance evaluations of + or perhaps an occasional 1. Such concentrations are rare in nature occurring in such species as *Glyceria maxima* which grows in dense, protracted colonies that preclude the invasion of competing species. There were exceptions to this rule, such as a case Tamsalu once encountered where there was a 70-80 cm high fern layer evaluated at 4.2, and under it a dense plant cover 5-6 cm high with a general density rating of 5-. But under such circumstances it was thought difficult to rationalize treating these groups as a single layer in one evaluation. Rather they would more often be separated into 2 substrata.

If, within the analysis of a stratum, one species were evaluated at 5.4 (about 80-90% cover), then at most, only two other species could have abundance evaluations of 2. (No higher evaluations were permitted). The remainder had to be evaluated at + and 1. A rating of 5.4 is also exceedingly rare in nature.

The author assessed the contents of 48 complete analytical tables from 5 of Tamsalu's unpublished manuscripts. These tables contained several thousand individual species evaluations. Among these, the combinations 5.4, 5.3, 5.2 and 5.1 were never used. The last three combinations would suggest an extremely unusual community structure.

The abundance estimate of 4:

Abundance ratings of "4" were also quite rare. When one species in a stratum was given a 4.5 rating, the remaining species would be evaluated about the same as in the case of a 5.5 evaluation.

If, within the analysis of a stratum, one species were evaluated at 4.3, 4.2, or 4.1 (60-70%), then of the remaining species:

a) one could have an abundance estimate of 3 in which case the remainder all had to be + and 1; or,

b) up to 4 could have an abundance estimate of 2, and the others had to be + and 1.

Examination of Tamsalu's analysis tables indicated that an evaluation of 4.4 was treated about the same as 4.3, 4.2 and 4.1, in terms of evaluations of other species in the same stratum.

Here, again there were exceptions, such as the case of a herbaceous layer once discovered under a black willow (*Salix nigra*) canopy. In this habitat *Lysimachia nummularia*, found in a trailing mat 10 cm deep, was evaluated at 4.4, but was overtopped by *Impatiens pallida* (3.1-4), *Solatium dulcamara* (3.3) and (2.3). When the data was tabulated, *L. nummularia* was isolated in the table to draw the unusual situation to the reader's attention.

The abundance estimate of 3.

Provided there were no higher abundance estimates, then at most three species could have an estimate of 3, in which case up to two species could be rated at 2 with the remainder of + and 1. If there were no ratings of 2, then a longer list of + and 1 ratings was possible.

The abundance estimates of 2, 1 and +:

Since there would only be a few dominant species in any given stand, it is evident that most abundance estimates would fall within this category. In fact, on the basis of averages extracted from 6 of Tamsalu's analytical tables (randomly selected), the evaluations +.1, +.2, 1.1,1.2, 2.1 and 2.2 together accounted for 90% of evaluations assigned. In order of most frequent use, they are arranged as follows: + .1 (about 40% of all ratings), + .2 and 1.1 (15-20% each), 1.2, 2.1 and 2.2 (5-10% each). These figures are averages over all strata and are not necessarily accurate reflections of the ratios within individual tree, shrub and herbaceous strata.

ii) Sociability evaluations:

For evaluating the mode of growth, the guidelines were not so definitive since even a single species could assume several modes of growth in a particular sample plot. Consider *Trifolium pratense* which, in developing from single young plants to established stands, could be rated at any sociability level from 1 to 4 (although 4 is seldom seen). This is the reason why it was sometimes necessary to assign two hyphenated sociability symbols to one species in a plot, as previously mentioned.

Braun-Blanquet used such evaluations as 3.5 and 2.5 for sparse but pure stands, through which it was the use of the sociability symbol 5 that emphasized the purity of the stand. (Braun-Blanquet defined his sociability estimates strictly in terms of sociability and purity of the stand, whereas Lippmaa more or less restricted the higher number sociability estimates to be used with the higher number abundance estimates). Such evaluations, employed for species like *Carex arenaria* and *Salicornia herbacea*, exemplified Braun-Blanquet's use of the sociability estimate of 5. Lippmaa did not use the sociability estimate in this manner and neither did Tamsalu. Rather they used such evaluations as 3.1, 3.2, etc., allowing the presence or absence of other species in the analysis, and their evaluations, to indicate the relative purity of the stand. Often Tamsalu worked with pioneer plants where this question of procedure frequently arose, and he felt Lippmaa's technique was more informative.

When necessary, Lippmaa used a special sociability symbol, an underdotted 5 thus: 5, to emphasize sparseness as follows: 1.5, 2.5, and even +.5 as, for example, with *Houstonia coerulea* below larger plants, or *Oxalis* spp. when' not well developed. It would usually be used only when the cover of the species was 5% or less. This symbol could create problems of interpretation so Tamsalu very rarely used it.

Much discussion was accorded the evaluation + .3, mostly used in woodland sample plots over 2000 sq. met. where all estimates pertained to these very large plots. When Tamsalu saw estimates of + .3 and 1.3 in any analysis of such a plot, he interpreted this to mean that the plot was very heterogeneous and the plants were grouped here and there. Within grass plots, which were very small by comparison, such an evaluation would mean that the given species existed only in one or two small patches or cushions within the plot.

Comparison with other methods

Tamsalu began vegetation cover analysis as early as 1922, when evaluations were still done by a particular frequency scale* which actually took no mathematically defined account of cover value, although in practice the points of the scale compared closely to the abundance scale used by Lippmaa. Each species was assigned an evaluation symbolized by an abbreviated Latin word describing frequency as follows:

Sol un (*solitarius unus* = one alone) only one

Sol (*solitariu*s - alone) growing singly, equal to +

Sol-sp (intermediate rating) about equal to 1

Sp (*sparsus* = to scatter) sparsely, about equal to 2

Sp-cop (intermediate rating) about equal to 3

Cop (*copiosus* = abundant) abundantly, equal to 4

Cop_2 (intermediate) very abundant

Soc (*sociales* = of partners or allies) pure stands, equal to 5

gr (*gregarius* = of a herd or f lock) could be appended to certain of the above evaluations to indicate a tendency toward clustering.

Tamsalu continued to use the above method through his Saaremaa research of 1927. It was also used by Braun-Blanquet and others before the total estimate method was developed.

* Tamsalu did not remember the name of the researcher who developed this scale.

Consider the Hult-Sernander (Scandinavian) method, which Tamsalu used in his Hiiumaa research in 1929, and which he found bothersome and time-consuming. Hult-Sernander used many coded notations and Tamsalu had great difficulty with their placement. There was also a different way of layering which depended entirely on gradations of height, of which there were altogether 10 levels. Grasslands, for example, belonged to the 8th (3-10 cm), 7th (10-30 cm) and 6th (30-70 cm) levels. Tabulation in this system was very complicated as indicated in this small and general example:

	level 8	level 7	level 6
Deschampsia caespitosa	3.2	2.2	1.2
Trifolium pratense	3.3	1.2	+.1

A table such as this would give a very fine overview of an agricultural situation and Tamsalu had used the method for such purposes. In Hiiumaa, however, while using the Hult-Sernander, method it became evident to him that each analysis took two to three hours, whereas with Lippmaa's method an analysis could be completed in 20 to 30 minutes. Even in the forest he considered himself able to do about 20 analyses per day by Lippmaa's method, if all the plots were reasonably close together, and he listed unknown species by a code number while taking specimens to identify later.

Tamsalu held to Lippmaa's methods since, although they were not appropriate for all occasions, he found them generally to be much simpler, clearer and faster to use than other methods.

APPENDIX II REFERENCE MATERIALS

PUBLISHED PAPERS AND UNPUBLISHED MANUSCRIPTS OF A. TAMSALU (TOMSON)

The list below includes all research papers known to have been written by Tamsalu from 1921 through 1959. All items in this section were consulted during the preparation of this biography, and all items are numbered whether or not they are specifically cited in the text.

1. Tomson, A.I. 1921. *The influence of the density of planting upon the harvest of potatoes*. (Eng. translation of Russian title.) Unpublished diploma thesis (some data from which was published in: Ümarik and Tomson, 1927). Institute of Agriculture, Petrograd, now incorporated into the estate of the Agricultural Institute, Leningrad. *No copy located.*

2. Ümarik, J. and A. Tomson. 1927. Riigi põllutöökatsejaam. 1. Aruküla 1920. a.— 31 .XI1.1924. a. (State Agricultural Experiment Stations 1. Aruküla, 1920 -Dec. 31, 1924.) Põllumajanduse peavalitsuse Aastaraamat I, 1918-1926. pp. 94-100. Tallinn.

3. Tomson, A. 1927 a. *Grasslands of Saaremaa (Oesel)*.(Eng. translation of Estonian title.) Reproduced by mimeograph. 100 pp + map. *No copy located*.

4. Tomson, A. 1929. *Grasslands of Hiiumaa (Dago).* (Eng. translation of Estonian title.) Reproduced by mimeograph. 110 pp + map. *No copy located*.

5. Tomson, A. 1933. *Botaanilisi märkmeid: Haruldaste taimede leiukohti saartel I*. (Botanical notes: Locations of rare plants on the islands I.) Loodusevaatleja 4:2.pp. 61-62. Tartu.

6. Tomson, A. 1933a. *Botaanilisi märkmeid: Haruldaste taimede leiukohti saartel II.* (Botanical notes: Locations of rare plants on the islands II.) Loodusevaatleja 4:3. pp. 92-93. Tartu.

7. Tomson, A. 1933b. *Mitmeaastane kuukress Nõmmeveskil*. (Several years old Common Moonwort at Nõmmevesk.) Loodusevaatleja 4:6. p. 188. Tartu.

8. Tomson, A. 1934. *Botaanilisi märkmeid.* (Botanical notes.) Eesti Loodus 2:4,5. p. 90. Tartu.

9. Tomson, A. 1935. *Floristilisi teateid*. (Floristic information.) Eesti Loodus 3:5. pp. 180-81. Tartu.

10. Tomson, A. 1935a. *Muhu soolakutaimedest*. (Halophytes of Muhu.) Esti Loodus 3:3. pp. 73-77. Tartu.

11. Tomson, A. 1936. *Kullerkupu (Trollius europaeus* L.*) levikust Saaremaal*. (Distribution of Globeflower (*Trollius europaeus* L.) in Saaremaa.) Eesti Loodus 4:1. pp. 11-12. Tartu.

12. Tomson (=Tamsalu), A. 1937. *Sõrve taimkate*. (The vegetation cover of Sorve). Eesti Loodusteaduse Archiiv. 2. seeria, 16: 1-2, pp. 1-87. Tartu.

13. Tamsalu (=Tomson), A. 1938. *Floristilisi märkmeid*. (Floristic notes.) Eesti Loodus 6:3. pp. 136-8. Tartu.

14. Tamsalu, A. 1938a. *Taimesotsioloogilisi märkmeid*. (Phytosociological notes.) Eesti Loodus 6: 1-2. pp. 178-9. Tartu.

15. Tamsalu, A. 1940. *Liiv-hundihammas (Astragalus arenarius* L.*) ja Kannaskipslill (Gypsophila fastigiata* L.*) Viljandimaal*. (Sand milkvetch (*Astragalus arenarius* L.) and Clustered Gypsophila (*Gypsophila fastigiata* L.) in Viljandi District.) Eesti Loodus 8:3. pp. 132-4. Tartu.

16. Tamsalu, A. 1940. *Floristilisi märkmeid*. (Floristic notes.) Eesti Loodus 8:3. pp. 156-7. Tartu.

17. Tamsalu, A. 1940. *Botanical textbook for Agricultural and Horticultural High Schools*. (Eng. translation of Estonian title.) 240 pp. Suspended during publication. *No copy located*.

18. Tamsalu, A. 1944. *Methods of Phytosociological Researching*. (Eng. Translation of Estonian title.) No. of pages unknown. Unpublished manuscript lost in 1944. *No copy located*.

19. Tamsalu, A. 1944a. *Plant Associations of Estonia*. (Eng. translation of Estonian title.) 2500 pp. of manuscript with 85 accompanying maps. Incomplete. Lost in 1944. *No copy located. Much or all of this information is on file at Tartu University*.

20. Tamsalu, A. 1950. *Reintali oru taimestikust*. (Vegetation of the Reintal Valley.) 41 pp. Unpublished manuscript in Royal Botanical Gardens archives.

21. Tamsalu, A. 1951. *The Vegetation of Keney Park*. Unpublished manuscript. No. of pages unknown. *No copy located*.

22. Tamsalu, A. 1952. *The Types of Connecticut Woods*. Unpublished manuscript in Royal Botanical Gardens archives. 64 pp. + 22 tables.

23. Tamsalu, A. 1953. *Eastern white cedar (Thuja occidentalis) in hardwood*. Unpublished manuscript in Royal Botanical Gardens archives. 12 pp. + table.

24. Tamsalu, A. 1953a. *The types of Festuca rubra associations*. Unpublished manuscript in Royal Botanical Gardens archives. 30 pp. + 8 tables. Estonian language abstract published as Tamsalu, A. 1954a.

25. Tamsalu, A. 1953b. *The vegetation of the southern section of the Royal Botanical Gardens and perspectives for its development*. Unpublished manuscript in Royal Botanical Gardens archives. 31 pp. + tables + photos.

26. Tamsalu, A. 1954. *Unfitted*. (A major revision of Tamsalu, 1953b). Unpublished manuscript in Royal Botanical Gardens archives. 30 pp.

27. Tamsalu, A. 1954. *Ameerika Uhendriikide Riigimetsad*. (United States Government Forests.) Aastaraamat IV: Yearbook of the Free Estonian Farmers Federation, pp. 36-39. English abstract p. 53. Stockholm.

28. Tamsalu, A. 1954a. *Punase Aruheina* (*Testuca rubra) taimeuhingute tuubid.* (The types of *Festuca rubra* associations). An abstract of Tamsalu, 1953a. Aastaraamat IV: Yearbook of the Free Estonian Farmers Federation, p. 44. English summary p. 54. Stockholm.

29. Tamsalu, A. 1954b. *Taimkatte areng Kesk-Euroopas ja Eestis parast jääega*. (Development of vegetation in northern Europe and Estonia after the Great Ice Age.) Eesti Metsamees Eksiilis. pp. 8-14. Stockholm.

30. Tamsalu, A. 1955. *The vegetation of Rondeau Provincial Park*. Unpublished manuscript in Royal Botanical Gardens archives. 22 pp. + photos + checklist + map.

31. Tamsalu, A. 1955a. *The Ecological Study of Vegetation at Ipperwash and Pt. Frank*. (SIC) Unpublished manuscript in Royal Botanical Gardens archives. 14 pp. Incomplete.

32. Tamsalu, A. 1955b. *Agr. Aleksander Tamsalu*. Aastaraamat V: Yearbook of the Free Estonian Farmers Federation, p. 59. (English summary p. 71). Stockholm. Reprinted in 1956. Kolmapaeval. Nr. 3(305) p. 4. Toronto.

33. Tamsalu, A. 1956. *Mis on Kliimaks?* (What is the climax?) Unpublished manuscript in Royal Botanical Gardens archives. 2 pp.

34. Tamsalu, A. 1957. *Climaxless vegetation successions: Cases in Southern Ontario*. Unpublished manuscript in Royal Botanical Gardens archives. 4 pp.

35. Tamsalu, A. 1957a. *The study of Ontario deciduous forest (D1)* + addendum titled *Additional explanations to the theme*. Unpublished manuscript in Royal Botanical Gardens archives. 9 + 2 pp.

36. Tamsalu, A. 1957b. *Theoretically possible climaxes of Ontario within hydric successions.* Unpublished manuscript in Royal Botanical Gardens archives. 6 pp.

37. Tamsalu, A. 1958. *The Wild Vegetation of the Royal Botanical Gardens*. Unpublished manuscript in Royal Botanical Gardens archives. 180 pp. Rosaceae to Compositae not completed.

38. Tamsalu, A. 1959. *The study of south Ontario vegetation: I. The Flora*. Unpublished manuscript in Royal Botanical Gardens archives. 19 pp.

39. Tamsalu, A. 1959. *The study of south Ontario vegetation: II. The Ecology*. Unpublished manuscript in Royal Botanical Gardens archives. 148 pp. Incomplete.

40. Tamsalu, A. 1959a. *An Album of Crataegus*. Unpublished manuscript in Royal Botanical Gardens archives. 47 pp. Incomplete.

ADDITIONAL BOOKS AND PAPERS

In addition to the above, the following books and papers were used as references. Numbered items are cited in the text. The remainder yielded general or historical information which is not specifically cited.

Anon. 1974. *Estonia: Story of a Nation*. Estonian House, New York.

41. Braun-Blanquet, J. 1965. *Plant Sociology*. (Authorized translation of *Pflanzen-soziologie* originally published in 1928). Hafner, New York.

42. Britton, N.L and A. Brown. 1913. *An Illustrated Flora of the Northern United States, Canada and the British Possessions*. 3 vol. Scribner's, New York.

43. Eichwald, K., A. Vaga, E. Varep and S. Talts. 1956. *N. Eesti Floora II*. (Eng. tr.: The Flora of Soviet Estonia II). Tallinn)?).

44. Eichwald, K. 1961. *On J. Lippmaa's Work in Floristics and Plant Geography*. Summary. In: Botaanilised uurimused I. Tartu, Eesti N.S.V. Teaduste Akadeemia. Zooloogia ja Botaanika Instituti.

45. Fernald, M.L. 1950. *Gray's Manual of Botany*. 8th ed. American Book Co., New York.

Fox, W.S. and J.H. Soper. 1954. The Distribution of Some Trees and Shrubs of the Carolinian Zone of Southern Ontario. Part III. Trans. Roy. Can. Inst. 30(2): 99-130.

46. Halliday, W.E.D. 1937. *A Forest Classification System for Canada*. Can. Dept. Mines and Resources; Lands, Parks and Forests Branch; Forest Service Bull. 89:4-50.

Kangro, B. 1970. *Universitas Tartuensis*. Eesti Kirjanike Kooperatiiv, Lund, Sweden.

47. Laasimer, L. 1965. *Eesti N.S.V. Taimkate*. (Eng. tr.: Vegetation Cover of the Estonian S.S.R.). Tartu, Eesti N.S.V. Teaduste Akadeemia. Zooloogia ja Botaanika Instituti.

Leppik, E.E. 1977. A. *Tamsalu as a Plant Sociologist*. Unpublished manuscript in RBG archives. 3 pp.

48. Lippmaa, T. 1923. *Ungrukolla (Lycopodium complanatum) alaliikide ule.* Loodus, 11. Tartu, lk. 138-146.

49. Lippmaa, T. 1926. *Floristische Notizen aus dem Nord-Altai nebst Beschreibungeiner neuen Cardamine-Art aus der Section Dentaria*. Eesti Vabariigi Tartu Ulikooli Toimetused, A 103, lk. 1-12 ja Acta Instituti et Horti Botanici Universitatis Tartuensis, I, 1-3. Tartu.

50. Lippmaa, T. 1926a. *Pigmenttypen bei Pteridophyta und Anthophyta*. (Eng. tr.: *On the Pigmentation Types of Pteridophyta and Anthophyta*). *I. AIlgemeiner Teil*. E.V.T.U. Toimetused, A 104,lk 1-71 ja Acta Instituti et Horti Botanici Universitatis Tartuensis, I, 1-3, Tartu.

51. Lippmaa, T. 1926b. *Pigmenttypen bei Pteridophyta und Anthophyta. II. Spezieller Teil*. E.V.T.U. Toimetused, A 111r lk. 1-233 ja Acta Instituti et Horti Botanici Universitatis Tartuensis, I, 1-3, Tartu.

52. Lippmaa, T. 1931. *Beitrage zur Kenntnis der Flora und Vegetation Sudwest-Estlands*. (Eng. tr.: *Supplementary Data on the Flora and Vegetation of Southwestern Estonia*.) Eesti Loodusteaduse Arhiiv, II seeria, 13, 3, lk. 95-347 ja Acta Instituti et Horti Botanici Universitatis Tartuensis, II, 3-4, Tartu.

53. Lippmaa, T. 1933. *Taimeuhingute uurimise metoodika ja Eesti taimeuhingute Klassifikatsiooni. pohijooni*. (Eng. tr.: *The Methods of Research into Plant Associations and the Fundamental Outlines of the Classification of Estonian Vegetation*.) T.U. j.o. Loodusuurijate Seltsi Aruanded, 40, lk. 1-169 ja Acta Instituti et Horti Botanic! Universitatis Tartuensis, III, 3. Tartu.

54. Lippmaa, T. 1938. *Eesti botaanilisest uurimisest*. (Eng. tr.: Estonian Botanical Research.) Eesti Loodus, 6, pp. 7-10, Tartu.

55. Lippmaa, T. 1939. *The Unistratal Concept of Plant Communities (the Unions).* Am. Midi. Nat. 21: 111-145.

56. Montgomery, F.H. 1945. *A Botanical Survey of Waterloo County, Ontario*. Trans. Roy. Can. Inst. 25: 217-265.

Racicot, H.N. and R.J. Moore. 1958. *List of Canadian Workers in the Botanical Sciences*. Canada Dept. of Agriculture, Ottawa.

Raud, V. 1953. *Estonia: A Reference Book*. Nordic Press, New York.

Ruttner, O. 1925. *The New Baltic States and their Future: An Account of Lithuania, Latvia and Estonia*. Methuen, London.

57. Smith, R.L. 1974. *Ecology and Field Biology*. Harper and Row, New York. See page 272.

58. Thomasson, K. 1953. *In Memoriam: Teodor Lippmaa [SIC] 1892-1943*. In: Sartryck ur Botaniska Notiser 1953. Lund, Sweden.

59. Trass, H. 1961. *T. Lippmaa's Phytocoenological Studies and the Method of Synusiae in Phytocoenology. Summary*. In: Botaanilised uurimused I. Tartu, Eesti N.S.V. Teaduste Akadeemia. Zooloogia ja Botaanika Instituti.

Uustalu, E. 1968. *Eesti Vabariik 1918-1940*. Eesti Kirjanike Kooperatiiv, Lund, Sweden.

ROYAL BOTANICAL GARDENS ANNUAL REPORTS

RBG Annual Reports for 1954 through 1962 (Special Bulletins #6 through #14) summarize the activities of Tamsalu at RBG and the eventual disposition of his plant collection. The following item is cited in the text.

60. Laking, L. ed. 1955. *Scientific Matters: Experiment and Research*. Special Bull. #7, Roy. Bot. Card., Hamilton.

REPORTS TO THE DIRECTOR BY A. TAMSALU

Tamsalu made a series of periodic written reports to the RBG Director outlining the progress of his work. The reports are dated from 09 Mar. 1955 to 08 Feb. 1959. The following items are cited in the text.

61. Tamsalu, A. 1955-59. *Untitled.* A daily journal of activities. Unpublished notebook in RBG archives.

62. Tamsalu, A. 1957. *Problems followed in 1957 studies*. Unpublished report in RBG archives. 2 pp.

WRITTEN CORRESPONDENCE

The author has examined and extracted information from 249 letters currently in the RBG archives. Of this total, 160 were written by Tamsalu, 43 were addressed to him, and the remainder involved other individuals. Those items cited in the text are listed below in chronological order. Tamsalu is abbreviated to A.T.

63. 15 Apr 51. A.T. to E. Leppik
64. 05 Jun 51. A.T. to B.A. Brown
65. 16 Sep 51. A.T. to E. Leppik
66. 04 Jan 52. A.T. to E. Leppi
67. 13 Jan 52. A.T. to E. Leppik
68. 03 May 52. F.H. Montgomery to A.T.
69. 12 Jun 52. Estonian Consulate (U.S.) to A.T.
70. 26 Jun 52. H.J. Oosting to A.T.
71. 07 Jul 52. W.F. Schreederto A.T.
72. 09 Jul 52. A.T. to E. Leppik
73. 16Jul 52. A.T. to M.B. Sherman
74. 02 Aug 52. A.T. to N.E. Forest Experiment Station
75. 02 Sep 52. A.T. to E. Leppik
76. 15 Sep 52. A.T. to E. Leppik
77. 09 Dec 52. M. Westveld to A.T.
78. 28 Dec 52. A.T. to M. Westveld
79. 02 Jan 53. A.T. to J. Olson
80. 27 Feb 53. A.T. to E. Leppik
81. 24 Apr 53. A.T. to M. Westveld
82. 05 Mar 54. A.T. to E. Leppik
83. 30 Jan 55. A.T. to E. Jarvesoo
84. 10 Jul 55. A.T. to E. Leppik
85. 15 0ct 55. A.T. to E. Leppik
86. 29 0ct 55. E. Leppik to A.T.
87. 01 Nov 55. A.T. to E. Leppik
88. 16 Nov 55. A.T. to E. Leppik
89. 14 Jun 56. A.T. to E. Leppik
90. 22 Sep 56. A.T. to E. Leppik
91. 06 Nov 56. A.T. to E. Leppik
92. 20 Nov 56. A.T. to J. Olson
93. 21 Dec 56. J. Olson to A.T.
94. 25 Jun 57. H.J. Oosting to A.T.
95. 30 Jun 57. A.T. to E. Leppik
96. 06 Jul 57. A.T. to H.J. Oosting
97. 10 Nov 57. A.T. to E. Leppik
98. 02 Mar 58. A.T. to *Reader's Digest*
99. 10 Mar 58. A.T. to J.H. Soper
100. 18 Mar 58. A.T. to *Life Magazine*
101. 19 Mar 58. J.H . Soper to A.T.
102. 04 May 58. A.T. to E. Leppik
103. 12 May 58. E. Leppik to A.T.
104. 17 Aug. 58. A.T. to E. Leppik
105. 06 Apr 59. A.T. to E. Leppik

106. 14 May 59. J.H. Soper to AT
107. 07Jun 59. AT. to E. Leppik
108. 21 Jun 59. AT. to E. Leppik
109. ?? Jul 59. A.T.to *Meie Etu*
110. 27 Jan 64. J.S. Pringle to J.R. Bray
111. 25 Feb 64. J.R. Bray to J.S. Pringle
112. ?? Jan 76. B. Boivin to J.B. Lord
113. 08 Mar 76. H. Aasamaa to E. Leppik
114. 08 Nov 77. J.H. Soper to J.B. Lord
115. 13 Oct 78. E. Järvesoo to J.B. Lord
116. 06 Mar 79. L. Laasimer to A. Tera
117. 10 Oct79. E. Järvesoo to J.B. Lord
118. 14Jan80. E. Järvesoo to J.B. Lord (including editorial remarks on the manuscript of this text)
119. 08 Apr 80. E. Järvesoo to J.B. Lord

PERSONAL COMMUNICATIONS OF J.B. LORD

Ten interviews were conducted with various individuals. Those cited in the text are listed below. Records of the remaining communications are in the RBG archives.

120. 07 Jan 76. With A. Tera
121. 29 Jun 77. With C.E. Peterson
122. 25 Nov 77. With A. Tera
123. 19 Apr. 79. With E. Jarvesoo
124. Aug (?) 79. With W. Crins.

MISCELLANEOUS DOCUMENTS

Research included study of numerous documents related to Tamsalu's work history, education, immigration and citizenship, as well as various rough notes and work books. Those items cited in the text are numbered below.

125. 05 Mar 53. *Certificate*. A notorized certificate prepared by E. Leppik on Tamsalu's educational and employment background. Document in RBG archives. 2 pp.

126. 11 Mar 53. Employment application to U.S. Civil Service Commission.

127. 01 Sep 47. *Certificate*. A transcript of courses successfully completed by A. Tomson at the Petrograd Institute of Agriculture. Document in RBG archives. 2pp.

128. Anon. 1957. *Comments on manuscript entitled "The Study of Ontario Deciduous Forest"*. Typed manuscript in RBG archives. 1 pg.

129. Tamsalu, A. undated. *Biography*. An unpublished curriculum vitae in RBG archives. 2pp.

130. Tamsalu, A. 1946-59. *Research field books*. 27 volumes. 26 in RBG archives. One not located.

131. Tamsalu, A. 1958(7). *The Sheet of Personal Memories*. One page typewritten manuscript relating four anecdotes. Unpublished manuscript in RBG archives.

132. Letter from E. G. Voss, Curator & Professor, University of Michigan Herbarium, to J. B. Lord, dated 16 Jan. 82, deposited in RBG Archives.

ROYAL BOTANICAL GARDENS TECHNICAL BULLETINS

A series of occasional publications interpreting various topics in the pure and applied biological sciences.

No. 1 Aquatic Plants for Fish and Wildlife, by W. John Lamoureux, 1957. Revised 1963, 1971.

No. 2 The Common *Aster* Species of Southern Ontario, by James S. Pringle, 1967. Revised 1981.

No. 3 The Common *Solidago* Species (Goldenrods) of Southern Ontario, by James S. Pringle, 1968.

No. 4 Checklist of the Spontaneous Vascular Flora of the Royal Botanical Gardens, Hamilton, Ontario, Canada, compiled by James S. Pringle, 1969.

No. 5 The Trilliums of Ontario, by James S. Pringle, 1970. Revised 1976.

No. 6 Proceedings of the Symposium — *A National Botanical Garden System for Canada* — Royal Botanical Gardens, Hamilton, Canada. October 22nd - 24th, 1971, edited by Peter F. Rice, 1972.

No. 7 Proceedings of the Symposium - *Horticulture as a Tool in Therapy* — Royal Botanical Gardens, Hamilton, Ontario, Canada, by L. Dennis, R. Halward, J. Lord, and A.S. White, 1975. (Out of print).

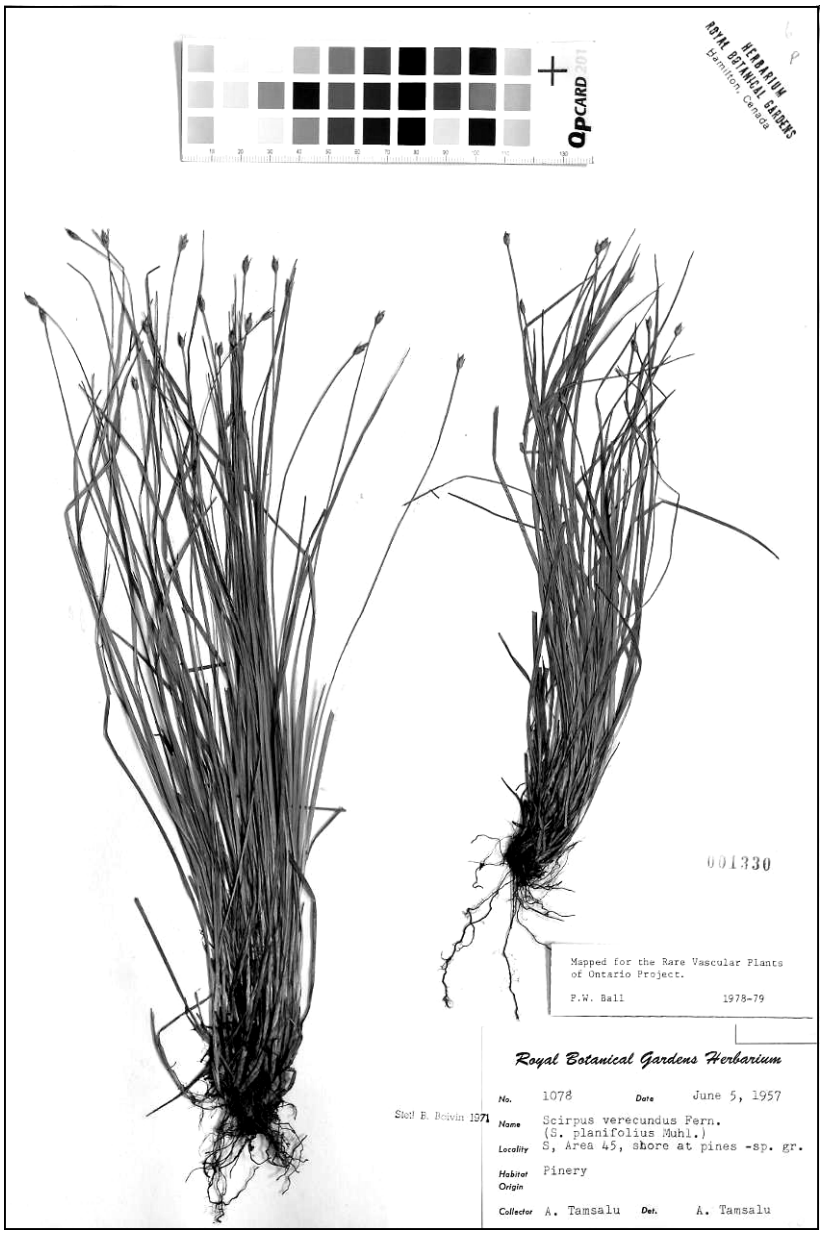
No. 8 A Survey of Wisterias in Southern Ontario Gardens, by Wray M. Bowden, 1976.

No. 9 Nature Trails, by W.J. Lamoureux and J.B. Lord, 1978.

No.10 An Introduction to Wetland Classification in the Great Lakes Region, by James S. Pringle, 1980.

No.11 Aleksander Tamsalu 1891 - 1960: A BOTANIST IN EXILE, by J.B. Lord, 1980.

APPENDIX III Photographic Supplement to the 2011 Edition



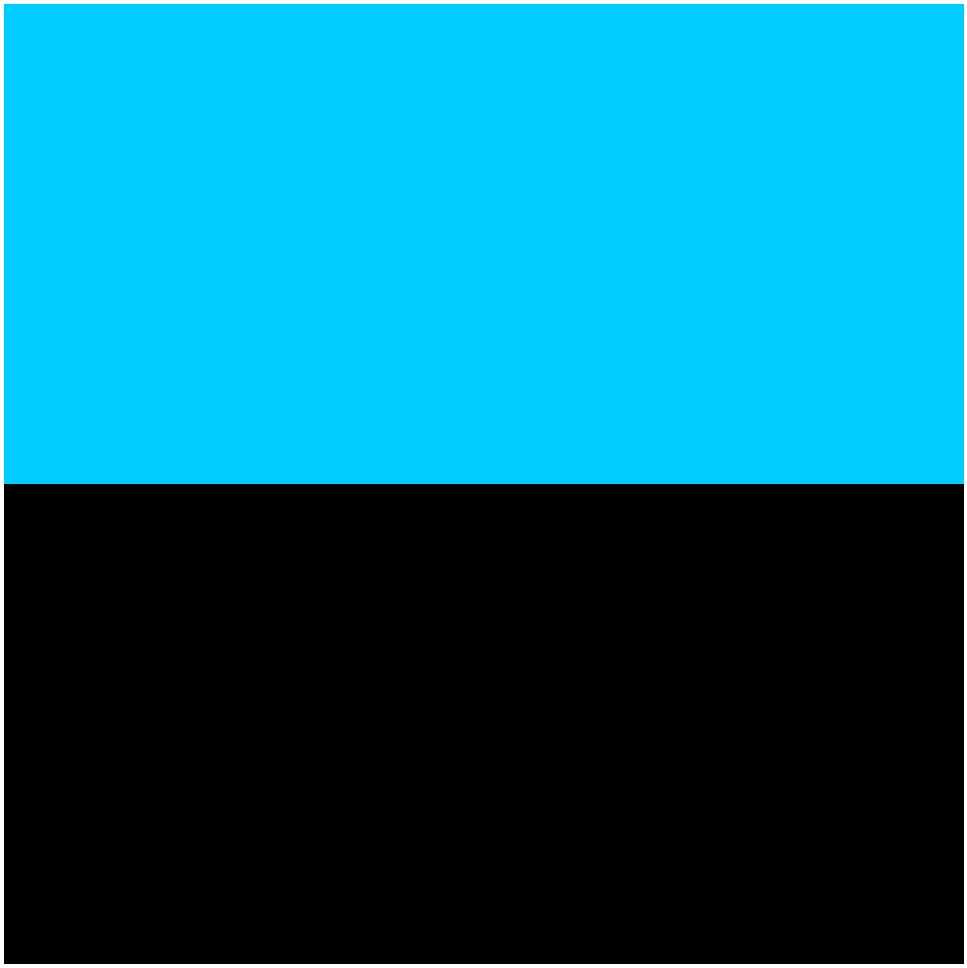
One of Tamsalu's herbarium sheets, with specimens collected 5 June 1957 from the nature sanctuaries of Royal Botanical Gardens. The species is a sedge, *Trichophorum planifolium* (previously named *Scirpus verecundis*) and goes by the poetic common names "bashful bulrush" and "few-flowered club-rush." As of 2011 this species is only known in Canada from the RBG nature sanctuaries and is listed as Endangered. Tamsalu discovered the first instance of this species in Canada.

Central portion of the group photograph for the IX International Botanical Congress, Montreal, August 1959. Tamsalu is seated in the sixth row above the railing, about six seats left of centre. Photograph provided by Mrs. Ainu Tera.

Enlargement of a portion of the group photograph of the IX International Botanical Congress, Montreal, from August 1959, centred on Aleksander Tamsalu. Photograph provided by Mrs. Ainu Tera.

Aleksander Tamsalu's headstone in Hamilton's Woodland Cemetery. Photographed August 2008 by David Galbraith.

Royal Botanical Gardens staff have made a tradition of visiting Tamsalu's grave each year to honour his birthday. Above, visitors on 28 August 2010 (his 119th birthday) included (L-R): M. Dormann, Videographer; M. Tombolini, Human Resources Generalist; J. Vanderheyden, Manager of Plant Records; L. Burtenshaw, Terrestrial Ecologist; N. Iwanycki, Herbarium Curator and Field Botanist; B. McGoey, Science Intern, guest S. Oldfield, Secretary-General, Botanic Gardens Conservation International; A. Henderson, Curator of Collections/Horticulturist; Dr. J. S. Pringle, Plant Taxonomist; Dr. D. A. Galbraith, Head of Science.



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