# Johannes Iversen

Dec. 27th 1904 – Oct. 17th 1971

Johs. Iversen

Johannes Iversen died on October 17th, 1971. Within the disciplines of plant ecology and of the history of vegetation his life's work stands out as one of the most original, inspired and penetrating. – Unfortunately he did not live to finish his work on the vegetational history and ecology of Draved Forest, a work to which he had devoted the last 20 years. More particularly it was the lime forest to which he gave his attention. Few have delighted like him in the beauty of the linden tree and in my memory the man and the tree are mysteriously connected.

The lime prefers fertile soil, yet may, while still a young tree bend like an humble vine enduring deep shadow. If brought out into light, however, it shoots up fast, tall and straight spreading its branches harmoniously to all sides. The bark remains smooth and even, and beneath the surface run the long, strong and sinewy bast fibres. The foliage stays fresh and green far into the summer when other trees have turned dark or faded. In the history of vegetation the lime replaces the oak and during the atlantic period it creates the selfperpetuating climax forest. It affords much shade and only few trees will grow underneath it. It blossoms in the height of summer and its strong scent of honey, which attracts many bees, is quite intoxicating. It stands with its roots deep in the sound and fertile mineral soil.

The beauty of the linden has been praised since time immemorial. It was a sacred tree. In heraldry its heartshaped leaves symbolize the free landowner and its soft, yet stringy wood which does not crack – white in colour but tinged with gold – was the favourite material of the sculptors of the Middle Ages for carving religious statues and altars, hence the name – *Lignum Sanctum.*

Iversen was born in 1904 at Sønderborg. Both his father Hans Iversen and his mother, née Asmussen, came of peasant stock from the southeastern part of Jutland. As a young man his father was attached to "Brødremenigheden" (the Moravian Brethren) as a missionary. The family was deeply religious and marked by the close to earth type of devotion characteristic of the Moravian Brethren. By chance he was engaged as an assistant at the Savings Bank at Sønderborg and after a comparatively short time he was made a director.

Iversen went to a German school until, in 1920, due to the Genforening (the reunion of North Slesvig with Denmark in 1920) he was sent to a Danish high school. As a consequence he was a master at the German language and up to 1940 he wrote all his articles in this language. After that date he wrote in English and made a great effort to master the language.

He finished school in Sønderborg State School in 1923 and took his degree as a Bachelor of Botany in 1930 at the University of Copenhagen. Ostenfeld became his teacher, but Raunkiær – then still active – was the one whose influence was to mark his work.

When, in 1931, Knud Jessen left The Geological Survey of Denmark in order to become Professor of Botany, Iversen was appointed to the job of part time assistant at this institute. In 1932 he participated in Aage Roussell's expedition to Godthaabsfjord in Greenland and in the autumn of 1933, together with Knut Fægri amongst others, he took part in the Baltic course of pollen analysis under the guidance of Lennart v. Post. Those six months were of decisive importance to him. He acquired a thorough knowledge of Quaternary geology and pollen analysis as it was studied in those days. For him the companionship of v. Post and Sernander, who was, in spite of being old, still full of intellectual vitality, was to become a lasting source of inspiration.

Not until 1938, having published his thesis in 1936, did he become afdelingsgeolog (sectional geologist) at the age of 34. He had to cover personally all the expenses involved in printing his thesis and it took several years before he was free of debts. In 1942 he became a State Geologist – an appointment he kept until his death. In 1955 he was made lecturer at the University of Copenhagen in pollen analysis and Quaternary vegetational history.

In 1939, he married Miss Aase Thorlacius-Ussing, a daughter of the principal of a Secondary School, Rev. B. Thorlacius-Ussing (who died in 1955) and his wife Martha, née Rasmussen. The marriage was blessed with one daughter. Iversen had the great sorrow of

losing his wife half a year before his own death from heart failure.

In 1953 he was made a member of the Danish Academy of Science, where he was a frequent visitor. His honours were few, but choice: He was a Doctor Honoris Causa at Uppsala and at Cambridge.

Iversen's life work has its starting point in the ecology of the plants: that is their relations to soil, climate, light or shade and their mutual competition. He had a profound knowledge of the plants and their habitats having studied them since childhood. As a consequence he was able in his research quickly to reach definite conclusions. His method reminds one of that of Miss Marple's in the detective stories by Agathe Christie. Miss Marple lives alone in a small house in a far away village and she possesses an intimate knowledge of the inhabitants, more specifically their psychology and character. In the solution of a crime riddle Scotland Yard is very useful checking up on alibis and carrying out systematic investigations, – yet when it comes to supplying the final clue to the mystery they are unsuccessful. It is up to Miss Marple and with ease and in great style she solves the problem, thanks to her profound knowledge of the people involved.

At 24 while still a student Iversen published a well-balanced and important study: "Studien über die pH-Verhältnisse dänischer Gewässer und ihren Einfluss auf die Hydrophyten-Vegetation." In this surprisingly mature piece of work he was able to prove how the distribution of various hydrophytes is conditioned by the pH of the lakes.

Peter Boysen Jensen, the Professor of Plant Physiology had noticed the quiet and talented student – he may have felt himself instinctively attracted by his congenial mentality.

While it was Raunkiær's idea to study the ways of life of the plants in relation to a few decisive outside factors, Boysen Jensen was of the opinion that one ought to examine the reactions of one single plant to all external influences in the laboratory. In fact he proposed to Iversen a research programme along these lines. Iversen was very fond of Boysen Jensen and admired him, but the proposal was an expression of exactly the opposite method to the one he himself wanted to employ, that is the study of the mutual competition among plants in face of a few decisive external influences – research that had to be carried out in nature.

He accomplished this method in his thesis: "Biologische Pflanzentypen als Hilfsmittel in der Vegetationsforschung", 1936, which was to be his only more extensive piece of writing – some 220 pages. Only few besides him have managed to create a similar total image. The framework is universal, that is the morphological adaptation of plants to drought or humidity in the widest sense, the 'hydrotypes' with the extremes Terriphytes-Limnophytes. Of these groups the first one is divided into a series covering the Xerophytes-Hygrophytes. The classification of these eco-types is based on clearly visible morphological characteristics and extensive statistical information demonstrates the justification of this classification. Also the distribution of plants in relation to the humidity of the soil (the Hygrobic-types) and the salinity of the place of growth (the Halobic-types) was proved. The main part of the research materials was collected at Skalling, where Iversen profited from the working conditions created here by Niels Nielsen.

Twice Iversen went to Greenland in the summer – on both occasions to the farther end of the Godthaabsfjord and in connection with the Norse investigations carried out by the National Museum. The first expedition, in 1932, formed the basis of two exceptional studies.

In "Moorgeologische Untersuchungen auf Grönland" (1934) Iversen shows how the arrival of the Norsemen to the area makes itself known by the appearance of a widespread layer of charcoal which indicates that the vegetation has been burnt down, for the purpose of encouraging the growth of grass. Yet even more important was the fact that he could prove that a widespread layer of pupae of the butterfly *Agrotis occulta* occurs precisely at the level, which marks the end of the Norse period in the Vestbygd. Precisely that same summer the vegetation at the farther end of the Godthaabsfjord was lain waste by an ex-

tensive attack of catarpillars (also *Agrotis occulta*) and for Iversen it was easy to imagine that the attack by caterpillars at the end of the Norse period might have been a contributary cause to the disappearance of the Norsemen as their live-stock would have been deprived of food.

In 1937 he published an article barely four pages long: "Et botanisk Vidne om Nordboernes Vinlandsrejser" ("Botanical Evidence of the Vinland-journeys of the Norsemen"). The point of departure was his find of one small, delicate Iridaceae species with blue flowers *(Sisyrhynchium angustifolium)* quite close to a Norse ruin at the farther end of Godthaabsfjord. In 1937 the number of finds had increased to four in all – all of them close to Norse ruins. Outside Greenland the nearest habitat of the plant is Newfoundland, 1700 km further south. Iversen refused the possibility of the Sisyrhynchium surviving the last glacial age on nunataks in Greenland. Its enigmatic and isolated appearance in Greenland can, in his opinion, only be reasonably explained if one assumes that the Norsemen often obtained hay in Vinland (close to the bay of Saint Lawrence) and that its seeds were being carried in this way to the Norsemen's settlements.

When, in 1937, Iversen returned to the inmost part of the Godthaabsfjord it was his intention to try to clarify its history of vegetation through pollen analytical examinations of the lake gyttja. In order to be able to interpret the pollen diagrams correctly, however, statistical examination of the contemporary plants had necessarily to be related to the present production of pollen. Not until 1954 were the results published. The botanical material was presented in a paper: "Über die Korrelationen zwischen den Pflanzenarten in einem grönlandischen Talgebiet" whereas the part dealing with the history of vegetation was published seperately as "Origin of the Flora of western Greenland in the Light of Pollen Analysis". The latter, especially, is of decisive importance. For more than 50 years botanists, zoologists and others had been discussing the question of the extent to which plants and animals might have been able to survive the last-glacial period on the mountaintops (nunataks) surrounded by the inland ice – a theoretical discussion frequently based on conjectures. By publishing material based on the history of vegetation, Iversen was on solid ground and was able to draw reliable conclusions. The result showed that only the most hardy plants have been able to survive on the nunataks, whereas the more demanding plants in terms of temperature are later immigrants.

It was Knud Jessen who through his extensive studies had laid the foundation for a division of the post glacial into periods based on the Danish vegetational history and who established the very useful pollen zone boundaries. It is to Iversen's merit that he penetrated deeply into the working of the historical evolution of vegetation. He started with the late-glacial period where he could profit from his experiences in Greenland.

Already in 1934 he made the decisive step of introducing grasses and sedges into late-glacial pollen diagrams which according to the traditional practice was estimated on the basis of the sum of tree pollen, on the assumption that these were bound to represent an essential part of the vegetation cover at the time. Later, in 1936, he took the full consequences and included the grasses and sedges in the pollen sum.

In the mid-thirties some scholars were of the opinion that the late-glacial period had been considerably warmer than had hitherto been assumed. The proof was supposed to be the numerous examples of pollen of trees and bushes such as alder, oak, lime and hazel. Iversen compared these finds with the other known finds of plants from the period and concluded that the theory must be erroneous. The problem was how to find the source of error. How did those incompatible plant finds happen to be placed side by side in the layers? As the late-glacial lake-deposits to a very large extent consist of clay which has been washed down from the boulder clay surrounding the lakes, it is conceivable that also the pollen from the warmth-requiring trees came from that same source that is in the last instance from interglacial or more ancient bogs. – Pollen-analytical examinations of the boulder clay proved the idea to be right. Iversen, however, did not leave it at that. He worked out

a method of separating the secondary pollen from the primary pollen which was contemporary with the sediments. By doing this, in 1936, in a masterly fashion, he succeeded in making the clay sediments, especially the late-glacial ones, available for pollen analysis. – In the years to come fundamental results followed one another in rapid succession. The disentanglement of the much discussed sequence of layers at Nørre Lyngby and the dating of the famous "Lyngby-Arrowhead" were published in 1942 and in that article, proof is presented of a warmer interval in the late-glacial period prior to the Allerød period, i. e. the Bølling period. In 1944, 1947 and 1951 respectively, information was published of finds of the Öland Rock-rose, Blue Cornflower and the steppe-plant *Ephedra* in late-glacial sediments. In 1953 the Allerød period, the warmer climatic interval in the late-glacial period, was dated thanks to the method of Carbon-14; this was one of the first tasks of the newly established dating laboratory at Copenhagen.

In 1954, Iversen gathered together his late-glacial studies in an exceptionally handsome and brilliant treatise in a volume dedicated to Knud Jessen. – Whereas the earlier historical studies of vegetation had to be based on leaves, twigs, seeds, fruits and suchlike plainly visible remains of plants, it was now possible for Iversen – thanks to his thorough studies of pollen morphology – to include a large number of newly discovered species in his list of plants from the late-glacial period. On the basis of this unique material he accomplished a division of the vegetational development within the period giving a precise account of changes in climate. His evidence for summer and winter temperatures as well as the precipitation was born out by these plant records.

In between his studies of ecology and vegetational history, Iversen also dealt with other subjects. Thanks to his talent for singling out the essential in any problem he often succeeded surprisingly quickly in reaching unerring solutions. I would like to illustrate this with two examples.

In 1928, Otto Rydbeck, the Swedish archaeologist had suggested that the Danish kitchen middens, were contemporary with the dolmens and passage graves of the Neolithic. Most of the Danish kitchen middens were linked with the highest water level of the *Littorina* sea, and the latest and highest of the two *Littorina* transgressions in Sweden could be seen to have culminated simultaneously with the early period of passage graves, with the consequence that the major part of the Danish kitchen middens must have dated from the same period – provided that one could point to more than one Danish transgression and that the last was the highest and contemporary with the last Swedish transgression. The Danes, however, insisted that Denmark only had one single transgression and that it culminated during the late Mesolithic.

Iversen was very fond of the writings of Søren Kierkegaard and it might have been the reading of the introduction to the passage "Guilty or not guilty" at the end of his book "Studier på Livets Vej" ("Stages on Life's Way"), where the lake of Søborg plays an essential part, that made him choose the now dried out Søborg Lake as the most suitable for solving the problem of one or more Littorina transgressions. During the Littorina period the lake was an inlet which joined the sea through a long narrow valley, a threshold, which was then below sea-level. If there had been several transgressions and regressions of the water surface of the Littorina sea one might have expected the gyttja deposits in the former Lake Søborg to show several inlet periods (transgressions) interchanging with lake periods (regressions). Through corings in the lake deposits and analysis of the occurring salt- and freshwater diatoms, Iversen was able to indicate four inlet periods or transgressions that thanks to pollen analysis could be dated in relation to the vegetational history so that the three earliest occur within the Atlantic period and the latest and presumably the highest at the beginning of the Sub-boreal period. – Other scholars have in different ways contributed to the elucidation of problems related to the Littorina transgressions, yet the contribution made by Iversen in 1937 will, beyond any doubt, remain the classical solution of the problem.

In 1938 Iversen was engaged in the examination of certain pollen for the purpose of being able to identify the plants in geological

deposits. During this work he noted that thrift, *Armeria vulgaris*, had two quite different forms of pollen (A and B respectively) which never appeared together on one plant. Cultivation experiments showed that plants of the A-pollen type could only be pollinated by the B-pollen and vice versa. Iversen now went to examine the pollen of the genus *Armeria* from Northern Greenland and Northern Norway *(A. labradorica)*, which, as it turned out, did not have different pollen (dimorphism), but only one form (monomorphism), which was an intermediate form between the A and the B-types, yet closer to the A form. Experiments with pollination showed that the self-pollinating *Armeria labradorica* with monomorphic pollen could pollinate the B-type of *Armeria vulgaris*, but not the A-type. – The conclusion was that *A. labradorica* originated from the A-type. After an examination of thrift pollen from a long series of localities scattered over the northern hemisphere it turned out that all the habitats of the dimorphic *Armeria vulgaris* occur within the – 10° January isotherm while all the monomorphic appear in colder areas. Furthermore it turned out that while *A. vulgaris* (with dimorphism and insect-pollination) showed rather great morphologic variation, the monomorphic thrift varieties (with self-pollination) could be subdivided in a number of morphologically stable groups: *A. macloviana, A. scabra, A. chilensis* and so on, with subgroups. Iversen considered the dimorphic *A. vulgaris* as the primeval form, and the monomorphic species as having arisen from this one during extreme arctic conditions, presumably during the Ice Age. The treatise was published in the 'Biologiske Meddelelser', published by the Academy of Science in 1940 as, "Blütenbiologische Studien I". The title shows that Iversen had hoped for an opportunity of continuing these studies. Alas, there never was a follow up to this splendid piece of research.

In 1941 Iversen marked his return to palaeoecology with the, by now, classical treatise, "Landnam in Denmark's Stone Age". This was a work which was to inspire a whole generation of vegetation historians. – Knud Jessen had fixed his pollen zone boundary VII–VIII (Atlantic Sub-Boreal period) at the point where the oak forest and especially the lime was in fast decline. While Knud Jessen left the question open as to the reason for this, others interpreted the decline of the oak forest as the result of a climatic deterioration. – Towards the end of the thirties pollen grains of the various plantains had been successfully classified. Furthermore they had been traced in postglacial deposits. In this way it was discovered that the ribwort plantain only appears after the zone boundary VII–VIII and often in large numbers – but never earlier. It was, as a consequence, plain to Iversen that the change in composition of the forest trees was caused by cultivation, through the interference of man who cleared the forest. To him it was inconceivable that ribwort plantain should be able to survive in a primeval forest. To this must be added, it was pointed out at the same time that the introduction into Denmark of Neolithic agricultural methods of farming probably happened at roughly that same period. As a consequence, Iversen could offer a brilliantly clear and acute account of the changes that took place in the forest as expressed in the pollen diagrams immediately above the zone boundary VII–VIII. – Large areas of forest had been cut down and burnt, cereals had been sown in the ashes and later the scorched expanses had been left as commons until they again became forest and the earlier condition was reestablished. One of the proofs of burning was the predominance of birch trees that invaded the burnt areas where their tiny seeds had favourable germination conditions. The pollen diagrammatic decline of the oak forest was fictitious up to a point as its curve was effected by the immigration of birch, elder and willow in the cleared areas. Finds of pollen of cultivated grain indicated agriculture and the slightly later appearance of ribwort plantain in large number together with the high percentage of grasses and wormwood show the temporary existence of large pastures.

This interpretation was so unexpected and elegant that in the first place it produced strong criticism. It was therefore decided to re-enact the "Landnam" as an experiment. It took 10 years before the plan could be carried out at

the research area at Draved forest which had been established thanks to large subsidies from the Carlsberg Foundation. During the period 1951–54 a considerable portion of the forest was cleared with the sole aid of polished thin-butted flint axes, burnt and some minor areas sown. Later, half of the cleared ground was grazed for a number of years whereafter, left to itself, it became overgrown. Before the start of the experiment the area was mapped out including the trees and the vegetation of herbs and with short intervals this practice has been continued. Now, 20 years later, it can be stated with certainty that all conditions observed during and after the experiment have confirmed Iversen's interpretation of the pollen diagrams.

The winters of 1939 and 1942 were exceptionally cold and a large number of plant species either suffered severe frost damage or died outright. Especially evergreens such as ivy and holly suffered badly, while another evergreen, the mistletoe evidently did not mind the cold. Iversen made a thorough survey of the damages in Denmark. During the period from the Ice Age and until to-day one can point to a rise, a culmination (some 5.000 years ago) and a decrease in summer temperatures. The appearance and disappearance of the pond tortoise and the aquatic water-chestnut are classic examples of this. On the other hand there has been no possibility of evaluating the winter temperature. Iversen was keenly interested in this question and he wanted precise results. This presupposed the possibility of defining the thermosphere of the chosen climatic indicators: mistletoe, ivy and holly. The concept of the thermosphere of a plant was defined by the naturalist J. F. Schouw as early as 1822, as the sum of the conditions of temperature subject to which a plant is able to thrive in nature. It soon turned out that the distribution of the above-mentioned plants followed neither the summer nor the winter isotherms. Iversen then constructed a system of co-ordinates with the July temperature as ordinate and the January temperature as abscissa so that the summer temperature increased in the negative direction (towards the south!) and the winter temperature decreased in the positive direction (towards the east!). Iversen was distinctly visual in his approach, and by making his system of co-ordinates function like a map of Europe he made it quite obvious that the summers became warmer, when one was moving towards the south and the winters colder when one went eastwards. By plotting the combined summer and winter temperatures of various meteorological stations into the system of coordinates and by indicating whether or not the plant in question was flowering near the station, he obtained a clear expression of the growth possibilities of the species and he was able to isolate its thermosphere. It now transpired that each of the three species in question had specific demands. The Mistletoe generally demands a high temperature in summer (min. 16°C), but will on the other hand tolerate severe cold (max. – 8°C). Ivy, on the contrary, does not stand up to winters below – 1.5° as a mean temperature for January, but will survive cool summers (about 14°C). The demands of holly are not unlike those of ivy only more extreme, it will tolerate only – 0.5° in January, but will make do with about 13°C in summer. On the basis of a very extensive pollen analytical material Iversen was now able to illustrate the change in summer and winter temperatures from Atlantic to Subboreal and further on to the Sub-atlantic period. – The paper appeared in a volume dedicated to Lennart von Post on the occasion of his 60th birthday in 1944 and was a suitable homage to the founder of the pollen statistic method.

In 1960 Iversen had been studying the forest ecologic problems at Draved forest for more than 10 years, a sufficient span of time for obtaining an insight into the essential problems, but too brief to allow an unambiguous interpretation of the minor changes in the forest. The life of a forest is long compared to that of man. Yet his intimate knowledge of the post-glacial vegetation history supplied him with a historical perspective which enabled him to place his observations of the living forest in a larger context. In the preface to his paper: "Problems of the Early Post-Glacial Forest Development in Denmark"

describe the period from the melting of the ice until the present time. It was a happy choice. In about one hundred pages, he succeeded in summarizing the extensive and comprehensive knowledge of this period – largely the results of his own studies, some of them as yet unpublished – in an inspired description for which the learned as well as the layman are indebted to him.

It has previously been mentioned that Iversen's epoch-making achievement within his chosen field was due to his profound knowledge of plants and their ecology. A prerequisite of the application of this knowledge to fossil material was, however, that it be possible to classify macro- and microfossils to genera and species. From about the middle of the nineteen thirties to the mid-fifties, a pioneer work was being carried out in Denmark with the purpose of making it possible to define those observations of pollen (the pollen-morphologic units) that might serve as a foundation for the identification of pollen of different plants. Iversen was the head of the Bog Laboratory at The Geological Survey of Denmark and together with collaborators partly at this institute and partly at the newly established Bog Laboratory at the National Museum, this most intensive and fruitful research work was carried out resulting in a long series of reliable identifications of the species of fossil pollen. – In 1950 the treatise: "Pollenmorfologiske definitioner og typer" ("Pollenmorphologic Definitions and Types") was published in collaboration with the present writer and in the same year appeared: "Text Book of Modern Pollen Analysis", written in collaboration with Knut Fægri, Professor at Bergen. The Text Book is a competent and concise treatment of all the aspects of pollen analysis including keys to pollen-determinations, sampling, unconsolidated sediments, the drawing of diagrams, statistics, how to interpret the material and last, but not least, the mentioning of a long series of possible misinterpretations that the pollen analyst must necessarily come across. The book has been worn to tatters by an entire generation of pollen analysts and in 1964 a new revised edition appeared.

The mastery of Iversen most clearly emerges in the brief treatise. – The subject is presented in a lucid and well arranged manner, the argument is brief, precise and comprehensive – like a piece of sculpture nothing can be added nor subtracted without disrupting the harmony of its entirety. The language is alive and clear, in spite of the fact that it was the result of endless toil. Iversen wrote in pencil in order better to be able to erase. I remember our collaboration on pollen morphologic definitions and types. The work lasted for some five to six years. Besides preliminary sketches the final draft of the article was typed out more than twenty times. Having arrived at the twentythird fair copy Iversen decided that further minor errors might be corrected in proof. I shall never forget the expression of Hilmar Ødum, the then director of The Geological Survey of Denmark, when telling us that we had by now had seven lots of proofs and that the eighth would positively have to be the last. The treatise consisted of only twenty small pages of print. The pleasure of reading Iversen's papers is like that of listening to 18th century music. In the same way as the leitmotif in a fugue by Bach has subordinated figures that sound together as well as in unison with the leitmotifs, so are works by Iversen saturated with patterns of observations and thoughts that make it possible to return continously to them in search of fresh knowledge and inspiration in tune with one's own more profound penetration into the theme.

Mention has been made above of only a few especially significant works. Iversen was, however extremely hard-working and he wrote about ninety papers. Only six of these amount to more than thirty pages and only his thesis for the doctorate attained 220 pages. The bulk of his work is brief communications, printed lectures of preliminary information – yet all of them essential. As a rule he published an adequate part of the material on which his observations had been based, yet it was in rare cases such as for instance in his thesis, in the Landnam-paper and in his late-glacial studies, that he produced the entire extensive and carefully collected material, which was always the solid basis of his conclusions.

As a lecturer Iversen was uneven. He was

at his best when he lectured from a manuscript, which had been finished in time – and when he stuck to it. The crucial point was the explanation of the first slide, which forced him to take his eyes off the solid ground offered by the manuscript with the not unusual result that he strayed away from the carefully worked out lecture – or he came to a full stop because the slide had set in motion entirely new ideas. On returning to the manuscript as a rule he found the right place – yet this was not always the case.

Iversen's was a markedly dialectic mind and to approach a problem from continuously changing angles was for him an indispensable part of the process of knowledge proper. With frequently a quite astounding stubbornness he would go on producing arguments in favour of a special point of view, whereupon he most unexpectedly would view the matter under an entirely new angle. In order to carry on a discussion with him it was necessary to know both him and the theme well. Very often he said the opposite of what he ment, jumping without warning to and fro within the subject. For him, discussion was never a play with arguments, but a deeply serious matter which allowed no time to be wasted on less carefully prepared contributions – they were swept aside – pleasantly as a rule yet with deadly poignancy, which, however, was not always understood. – To carry out a debate with Iversen was, as a rule, so inspiring and enriching that one forgot time and place. I recall, how discussions started during a small stroll at Draved forest after supper, would be continued, while still wandering, until the light of dawn when the grass was drenched with dew.

Equally characteristic of Iversen was his singleness of purpose and his unusual capacity for concentration. His contribution to research bears witness of this. At times, however, during daily contacts this singleness of purpose might take a shape which could be mistaken for ruthless egoism. Yet to him it was the cause, the work and the problems that were of paramount importance and a different interpretation would presumably have been impossible to his way of thinking. Personally he was extremely considerate and sympathetic. The matter that at any given moment was in focus was all important and drove everything else out of his vision. His absentmindedness, that twinbrother of concentration, must undoubtedly be seen as a consequence of this. All those who have known him will be able to tell most stunning tales of this absentmindedness.

Iversen as a rule avoided getting involved with administration. On the other hand he did a great and conscientious job when, occasionally, he did take it on. His work as a member, from 1959–67, of 'Statens almindelige Videnskabsfond' bears witness to this, as does the organisation of the Quarternary Botanical Congress in Denmark in 1953. A place apart should be given to the work he did in order to secure the research areas of Draved Forest, Skallingen and Løvenholm forest. He was here fighting for vital research interests and it was thanks to his initiative that the 'Komitéen for Forskningsarealer' was established in 1968 under the auspices of the Academy of Science.

Iversen was an all-round naturalist and it was a treat to accompany him whether at Skallingen, in Greenland or in Draved forest. When with him nature opened up. In my memory the experience of the singing of birds, the form of leaves and the sharp characteristic smell of mor-ground stand out with a strange intensity when experienced in his company because of the way in which he seemed to communicate his own love of nature to his companion. Some are blessed with a talent that make others remember their words. Iversen made one remember what one saw. He was, also very well versed in literature and philosophy. Names like Sigrid Undset, Albert Schweitzer, Dostojefski, Karl Barth, Simone Weil and Pierre Teilhard de Chardin may give an idea of his many interests. Poul Martin Møller and Søren Kierkegaard ('the Acts of Love') were presumably the two authors to whom he most frequently returned. During a period, while young, he had a certain connection with a religious movement, the Tidehvervsbevægelse, inspired by Karl Barth.

Iversen was slightly above average in height, harmoniously built with a calm, quiet and rather reticent manner which did not prevent him from being a live and sharp observer of

the surroundings yet which helped to conceal a sensitive and impressionable disposition. The cords of his heart were tightened to breaking point hence its pure and clear notes.

All through life he was favoured with good working conditions, though he had to wait long before obtaining reasonable economic conditions.

Plant ecology was the nucleus of his research and from that mainstream it spread in all directions.

Iversen went his own way. Within his chosen field his skill was supreme to such a degree that only few could follow him. He did not found a school and left no pupils proper – yet to many scholars his writings and conversations have meant decisive and life-long inspiration.

He preferred nature to the laboratory and at Draved forest he became part of the fauna, listening and observing. He reluctantly picked a flower, but preferred with his beautiful hands gently to disentangle it from its surroundings in order better to observe it.

Iversen's attitude to research can only properly be understood if seen in the light of his deeply religious total view of existence. He felt that to explore life in all its forms was his mission in life, a vocation which he approached with loving humility. From this attitude springs the strength which sustained his life-work and gave it lasting value.

Let us pay tribute to his memory!

*J. Troels-Smith.*

The above is a translation of a speech read before the Royal Danish Academy of Sciences and Letters, 16th February 1973. My sincere thanks are due to Mrs. Gertrud Køpke Sutton for the work of translation.

## List of Johannes Iversen's publications

1928: Über Isoëtes in China und Japan. *Dansk bot. Ark.* 5, 23, 4 pp.

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