Zusammenfassung

1. Die vorliegenden Angaben bestätigen frühere Beobachtungen, wonach durch Spätfrost betroffene, in der Höhenentwicklung gehemmte Junglärchen im folgenden Jahr fruktifizierten. Gleiches war an Lärchen festzustellen, deren Höhenzuwachs durch Dürre beeinträchtigt worden war.

2. Es konnte nachgewiesen werden, daß die fruktifizierenden Lärchen im Jahr nach der Zuwachsdepression wieder normale und im Durchschnitt bessere Höhentricbe zeigten als die übrigen Individuen.

3. Da das Blühen und Fruchten der Junglärchen mit stattgehabter Dürre- bzw. Spätfrosteinwirkung in Verbindung stand und Lärchen mit unterschiedlichen Zapfen- und Blütenmerkmalen in ähnlicher Weise zum Blühen veranlaßt wurden, wird die Auffassung vertreten, daß ein Blühen und Fruchten bei Junglärchen nicht als Hinweis auf eine schlechte Provenienz gelten kann. Dies umso weniger, als innerhalb eines umfangreichen Kollektivs nur die wüchsigsten Pflanzen zum Blühen und Fruchten neigten.

Summary

Title of the paper: *Further Observations on the Flowering and Fruiting of Young Larch Trees.*

1. The data confirm earlier observations that young larches affected by late frost and retarded in height growth flowered in the following year. The same can be said of larches whose height increment has been reduced by drought.

2. It can be shown that in the year following the depression of increment, the flowering trees showed shoot growth that was normal and on average better than in the non-flowering individuals.

3. As flowering and fruiting of these young larch trees was connected with previous drought and late frost, and as flowering was stimulated in trees that differed in their cones and flowers, it is concluded that flowering and fruiting in young larches is not necessarily an indication of bad provenance. Rather the opposite, because within a large sample only the fastest-growing trees inclined to flowering and fruiting.

Résumé

Titre de l'article: *Nouvelles observations sur la floraison et la fructification de jeunes mélèzes.*

1. Les resultats confirment les observations antérieures dans lesquelles de jeunes mélèzes touchés par des gelées tardives et dont le developpement en hauteur avait été retardé ont fructifié l'année suivante. Les mêmes observations peuvent être faites sur des melezes dont l'accroissement en hauteur a été réduit par la sécheresse.

2. On a pu prouverque, dans l'année qui suit celle ou la croissance a été réduite, les melezes fructiferes ont montré des accroissements en hauteur normaux et en moyenne meilleurs que ceux des autres individus.

3. Puispue la floraison et la fructification des jeunes melezes est liee a des influences anterieures de secheresse et de gelée tardive et, puisque la floraison a été stimulée de la même façon pour des melezes qui présentaient des caracteres differents en ce qui concerne les cônes et les fleurs, on en conclut que la floraison et la fructification chez les jeunes melezes ne peu vent pas être pris es comme un caractere indicatif d'une mauvaise provenance. Cela d'autant moins que, a l'intérieur d'une grande population, seulement les arbres les plus vigoureux ont tendance a fleurir et a fructifier.

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Analysis of the Collective Species Betula alba L. on the Basis of Leaf Measurements

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Introduction

Between 1950 and 1952, Professor JENTYS-SZAFEROWA published three interesting papers on an analysis of the collective species *Betula alba* L., (JENTYS-SZAFEROWA, 1949, 1950, 1951). In these papers, JENTYS-SZAFEROWA suggested that it was possible to distinguish between different species of birch by comparison of a number of leaf measurements, and that analysis of these measurements shed some light on the problem of the collective species of *Betula alba,* a problem with which she was particularly concerned. JENTYS-SZAFEROWA also pointed out the wide applicabiiity of such a method in the solution of taxonomic problems, and expressed the hope that it would be so employed.

The interest of the present authors in these useful and provocative papers arose from a disagreement about the identification of particular specimens of birch belonging to the collective species of *B. alba.* The data published in one of these papers (JENTYS-SZAFEROWA, 1951) provided exactly the sort of evidence needed to solve the problem under dispute, and it became clear they deserved the more powerful methods of statistical analysis made possible by the introduction of electronic digital computers.

The method suggested by Professor JENTYS-SZAFEROWA for the interpretation of the multivariate comparison of her data was called by her "the line of shape", and required the calculation of the ratio of each measurement to corresponding measurements of some standard species. These ratios, plotted in a special way, and joined by a series of straight lines, gave characteristic polygonal forms for different species or varieties of birch, and enabled her to identify particularly difficult groups as well as to postulate a taxonomic classification of the collective species *Betula alba* L. The method was delightfully simple to understand, but was nevertheless laborious and made the final decision that of a visual assessment of a complex polygonal form.

Table 1. — Mean values of observed variables for groups of birch species.

Group	Number of: -		A	B	C	D	E	F	G	J	L	M	N	O	P
	trees	leaves	Petiole length	Blade length	Blade width	Pairs of lateral nerves	Dist. of first tooth from base	Dist. btw. tips of 2nd & 3rd nerves	No. of teeth btw. 2nd & 3rd nerves	Mean dist. of nerves	Pos. of widest part	Axil of second nerve	Base angle	Apex angle	No. of leaves on dwarf shoot
B. verrucosa	50	100	15.77	41.30	32.65	6.68	12.59	6.63	4.81	6.17	3 24	38.20	68.50	10.20	2.16
B. verrucosa	500	1000	15.71	41.50	33.15	6.96	12.86	6.45	4.85	5.99	3.12	38.90	67.15	19.40	2.11
B. pubescens	50	100	12.98	42.90	33.55	6.63	9.71	6.41	3.98	6.51	2.60	36.65	65.75	32.30	2.28
B. pubescens	500	1000	13.85	45.15	34.65	7.17	10.05	6.68	4.23	6.30	2.63	36.90	66.20	30.75	2.51
B. tortuosa	350	700	12.65	40.80	33.40	5.35	8.82	6.29	3.60	7.67	2.42	30.20	64.35	39.98	2.93
B. carpatica	500	1000	13.22	42.79	35.43	6.11	8.83	7.01	3.91	7.05	2.80	34.77	71.76	35.39	2.80
B. oycoviensis	50	100	13.10	27.85	21.10	4.87	9.11	4.69	3.38	5.79	2.62	31 20	63.20	26.80	3.20
B. obscura	25	50	14.78	39.20	30.70	6.82	12.02	5.98	4.88	5.83	3.14	39.10	66.70	19.40	2.12
B. nana	50	100	1.72	8.23	8.70	2.65	2.53	1.53	2.03	3.19	2.04	25.35	67.90	71.15	2.72
B. humilis	50	100	3.74	19.85	14.18	4.98	4.24	4.02	3.64	4.01	2.11	43.10	56.45	51.35	2.64

While the results were extremely convincing, one of us was concerned that much of the information contained by the data was being discarded, and that some of the striking success of the method appeared to be due to a very high degree of correlation between the selected variables. Accordingly, it was decided to subject Jentys-Szaferowa's data to methods of multivariate analysis in order to confirm her conclusions, and to shed further light on the taxonomic problem of *Betula alba* in Great Britain.

Variables considered

Thirteen basic variables were used in Professor Jentys-Szaferowa's papers. These were: —

A. Petiole length;
B. Blade length;
C. Blade width;
D. Number of pairs of lateral nerves;
E. Distance of first tooth from blade base;
F. Distance between tips of second and third nerve,
G. Number of teeth between tips of second and third nerve;
J. Mean distance of nerves;
L. Position of widest part of blade;
M. Axil of second nerve;
N. Base angle;
O. Apex angle;
P. Number of leaves on dwarf shoot.

Three other variables were also included but these were ratios of some of the basic variables, i. e.

H. Ratio of blade length to petiole length;
I. Ratio of blade length to blade width;
K. Ratio of blade length to distance of first tooth;

and are not further considered. The use of ratios of the basic variables in contrast to simple linear combinations is discussed in detail later in this paper.

Mean values of each of these variables were given for ten groups of birch sampled from over the whole of Europe, and representing the main sub-species of *Betula alba* L., but also including samples of *Betula nana* L. and *B. humilis*. These values are shown in *table 1,* together with the numbers of trees and individual leaves contributing to each mean. The analysis described in this paper is based entirely on the data of *table 1*. It would, of course, be preferable to analyse the data for the individual trees and leaves, so as to determine the relative variances and covariances, but these data were not included in the original papers.

Correlations between variables

Table 2 gives the coefficients of correlation between the mean values of the observed variables, and from this table it is clear that there are very strong intercorrelations between the variables. Petiole length, blade length, blade width, number of pairs of lateral nerves, distance of first tooth from blade base, distance between tips of second and third nerve, and number of teeth between tips of second and third nerve form a close group of highly and positively, correlated variables. The position of the widest part of the leaf is also highly and positively correlated with the variables of this group, while the mean distance of the nerves is correlated with all these variables except the number of teeth between the tips of the second and third nerve, and the position of the widest part of the leaf. In contrast, the apex angle is significantly, but negatively, correlated with all of the variables so far mentioned. The axil of the second nerve is positively correlated with the

Table 2. — Correlations between measured variables for species of birch.

A												
907***	B											
896***	992**	C										
847**	916***	874***	D									
969***	853**	835**	870**	E								
890***	985***	972***	914***	834**	F							
814**	797**	755*	935***	897***	819**	G						
821**	897***	912***	663*	690*	891***	536	J					
876***	716*	712*	775**	940***	717*	872***	519	L				
300	398	317	687*	418	477	758*	087	423	M			
435	393	482	224	390	334	163	361	514	-330	N		
-929***	-780**	-741*	-842**	-964***	-793**	-900***	-616	-928***	-512	-258	O	
-354	-387	-374	-610	-541	-349	-691*	-009	-609	-597	-240	478	P

* Significant at 0.05 level of probability.
** Significant at 0.01 level of probability.
*** Significant at 0.001 level of probability.

number of pairs of lateral nerves, and with the number of teeth between the tips of the second and third nerves, but is not significantly correlated with any other variable. The base angle is not significantly correlated with any of the other variables, and the number of leaves on the dwarf shoot significantly correlated only with the number of teeth between the tips of the second and third nerve

These very high correlations suggest that the thirteen variables are in fact measuring a much smaller number of fundamental "dimensions" of the leaves. If this is so, it is relevant to ask how the interrelations of these variables can best be represented, and whether a smaller number of variables might not carry all the necessary information. If the "dimensions" can be identified biologically, then the basis for the taxonomic separation of the groups can be made clearer. Whether or not the "dimensions" can be given any biological interpretation, the essential framework provided by the reduction of the multivariate problem to a smaller number of "dimensions" may, in turn, provide a useful basis for the identification of specimens from unknown groups or for the review of the existing classification.

The mathematical background to problems of this kind is already well understood and has been presented in publications reasonably understandable by biologists (Kendall, 1957; Rao, 1952; Quenouille, 1952). Biologists have, however, been slow to take advantage of the existing mathematical theories for the solution of practical problems, partly because of the mathematical form of the theories themselves, and partly because of the difficulties of the large amounts of computing involved in their application. The latter difficulties have very largely been solved by the introduction of electronic computers to the field of biological research. The present authors will not attempt to remedy the first difficulty but will content themselves with a brief explanation of the principles behind the analysis, leaving the interested reader to look for further explanations in the references already quoted.

Component analysis

The particular type of multivariate analysis that has been employed in the work described in this paper is known as "principal component analysis". Its object is to economize in the number of variates by seeking linear transformations of the type

$$Z_1 = a_1A + b_1B + c_1C + \dots\dots\dots + p_1P$$
$$Z_2 = a_2A + b_2B + c_2C + \dots\dots\dots + p_2P$$
$$\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots$$
$$Z_n = a_nA + b_nB + c_nC + \dots\dots\dots + p_nP$$

If the data can be expressed in terms of fewer than n of these transformations, a genuine reduction in the dimensions of the problem will have been achieved, the whole complex of variations being expressible in $\underline{m} < \underline{n}$ variates. In general, this may not be possible, and it is then necessary to attempt an approximate reduction in the following way: —

1. Choose the coefficients $a_1, b_1, c_1, \dots\dots p_1$ so that the first of the new variates Z_1 has as large a variance as possible.
2. Choose a second set of coefficients $a_2, b_2, c_2, \dots\dots p_2$ so that the new variate Z_2 is uncorrelated with the first and has as large a variance as possible.
3. Continue, in this way, to find further new variates, Z_3 ...... Zn such that they are all uncorrelated and that each accounts for as much of the remaining variation as possible.

Table 3. — Percentage of variation accounted for by new variates (components).

Component	Percentage of variation accounted for	Cumulative Percentage
I	70.82	70.82
II	14.27	85.09
III	8.58	93.67
IV	4.31	97.98
V	1.33	99.31
VI	0.48	99.79
VII	0.15	99.94
VIII	0.04	99.98
IX	0.02	100.00

If this procedure is followed through, it is frequently found that the first two or three of the new variates account for a large proportion of the variation described in the n original variables, and, in this situation, it is fair to say that the variation is represented approximately by the first two or three variates.

Mathematically, the calculation of the new variates, or components, is equivalent to finding the eigenvalues and eigenvectors of the matrix of correlation coefficients given in *table 1* (Aitken, 1956). Methods of carrying through the necessary computations on electric desk machines are given in National Physical Laboratory (1961), but it is more economical of both time and money to use electronic digital computers wherever possible. The analysis described in this paper was carried out on a Ferranti Pegasus computer, using a component analysis programme specially written for that computer.

Table 3 gives the percentage of variation accounted for by each of the first nine new variates computed from the thirteen basic variables, and the cumulative percentage of variation. The first nine components account for all of the variation contained by the thirteen original variables, and it is clear, therefore, that four of the original variables are so highly intercorrelated with others as to provide no further information. Furthermore, the first three variates account for about 94 percent of the original variation, 70 percent by the first component alone. The first five components account for more than 99 percent of the variation.

Thus, it is clear that the data of *table 1* contain a great deal of redundant information, at least six of the variables providing no valuable information. Practically all the essential variation contained by the data can be expressed in terms of three, or at most five, of the variables. This alone suggests the possibility of very great economy of effort in the further consideration of the taxonomic problem of

Table 4. — Weighting for original variables in computed components.

Variable	Weighting given to variables for component: -				
	I	II	III	IV	V
A	0.31	-0.15	-0.00	0.28	0.13
B	0.31	-0.14	-0.17	-0.24	0.10
C	0.31	-0.20	-0.11	-0.29	0.09
D	0.31	0.14	-0.11	-0.19	-0.01
E	0.32	-0.00	0.11	0.30	0.27
F	0.31	-0 10	-0.23	-0.20	-0.19
G	0.31	0.26	0.01	0.06	-0.08
J	0.25	-0.37	-0.33	-0.08	0.14
L	0.29	0.05	0.34	0.32	-0.23
M	0.17	0.57	-0.22	-0.16	-0.52
N	0.13	-0.42	0.62	-0.28	-0.47
O	-0.30	-0.08	-0.04	-0.48	0.03
P	-0.18	-0.41	-0.46	0.41	-0.54

Table 5. — Calculated values of the first five components for the individual groups.

Group	Value of component: -				
	I	II	III	IV	V
B. verrucosa	1.95	0.63	-0.36	-1.89	0.17
B. verrucosa	2.00	0.14	-0.55	-1.53	0.08
B. pubescens	1.12	-0.14	0.02	-0.21	0.27
B. pubescens	1.37	-0.23	0.05	-0.34	0.28
B. tortuosa	0.30	0.25	0.07	1.00	-0.11
B. carpatica	0.50	0.31	0.09	-0.62	-0.43
B. oycoviensis	-1.12	0.59	0.44	0.69	-0.05
B. obscura	1.67	0.12	-0.45	-1.38	0.07
B nana	-5.91	-0.23	-0.77	2.17	0.19
B. humilis	-1.88	-1.46	1.46	2.10	-0.47

birch species, at least as far as the problem can be confined to leaf measurements.

It is of interest to identify the components which account for so much of the variability contained by the thirteen original variables, and *table 4* gives the relative weighting of the standardized original variables in the first five components, i. e. the deviations from the means of each variable divided by their respective standard deviations. The first component is clearly a general measure of leaf size, approximately equal weighting being given to all variables expressing the physical size of the leaf. The negative weighting of 0, the apex angle, emphasises the highly significant and negative correlation of this variable with leaf size. The second component is less readily identifiable, but appears to be a description of the venation of the leaf. The third and fourth components represent the shape of the leaf at the base and tip respectively, while the fifth component gives greater weight to the number of leaves on a dwarf shoot, the axil of the second nerve, and the base angle of the leaf.

From the weightings of *table 4,* the values of the components for each of the groups shown in *table 1* can be computed, and these are given in *table 5.* The values for the first four components are also plotted in *figures 1 and 2.*

The first component clearly distinguishes the collective species of *Betula alba* L. from the other main species of *Betula nana* L. and *Betula humilis.* The groups belonging to the *B. alba* L. species all have values greater than zero, and most of these, i. e. *B. verrucosa* Ehrh., *B. pubescens* Ehrh., and *B. obscura* Kotula, have values greater than + 1.00. *B. nana* L. has a value nearly — 6.00, with *B. humilis* intermediate at — 2.00. *Betula oycoviensis* Bess. does not appear to be a member of the *B. alba* group having a value closer to that of *B. humilis. Betula humilis* is however distinguished from *B. oycoviensis* Bess. by its negative value for the second component.

The third component serves mainly to distinguish further between *Betula humilis* and *Betula nana* L., giving a positive value for the first, and a negative value for the second. The fourth component provides the greatest dispersion of the groups properly included in the collective species of *Betula alba* L., and, in particular, separates the groups of *Betula carpatica* Waldst. et Kit. and *Betula tortuosa* Ledeb. The fifth component apparently provides very little separation of the groups included in this analysis.

Most botanists would insist that comparisons between groups should be based on ratios of the original variables rather than upon absolute changes in the variables themselves. This idea stems from the deeply rooted hypothesis that biological entities exhibit proportional changes rather than absolute changes, an hypothesis more frequently assumed than stated and more frequently stated than tested. It is, nevertheless, fair to ask whether a clearer interpretation of the data analysed in this paper could have been obtained by an analysis of the ratios of the variables. To obtain greater generality, however, it is easier to transform the variables into logarithms and to carry out a principal component analysis to obtain linear combinations of the transformed variables. By virtue of the transformation,

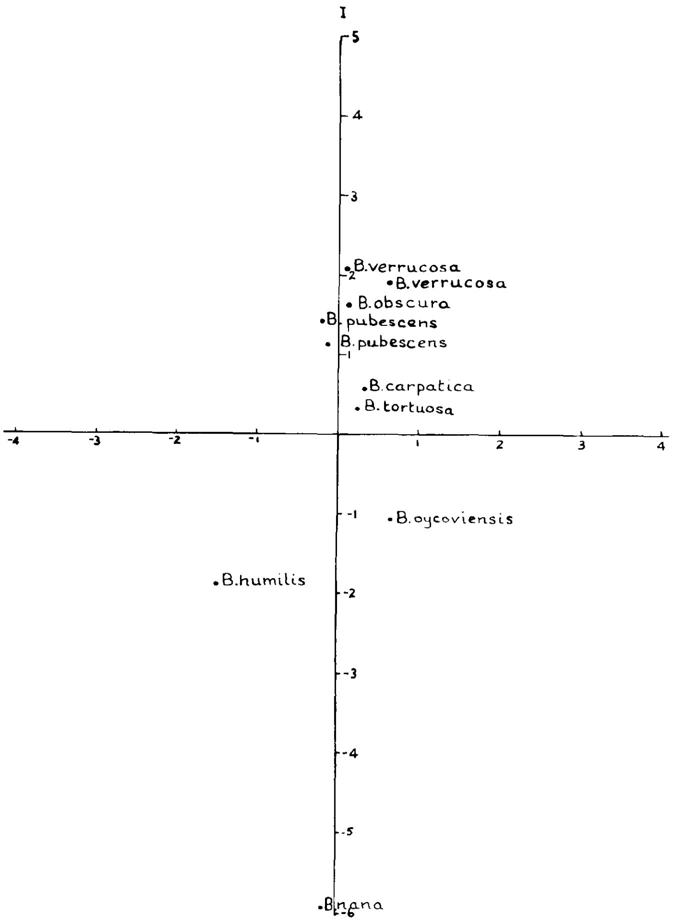

Figure 1. — Projection of First Two Components.

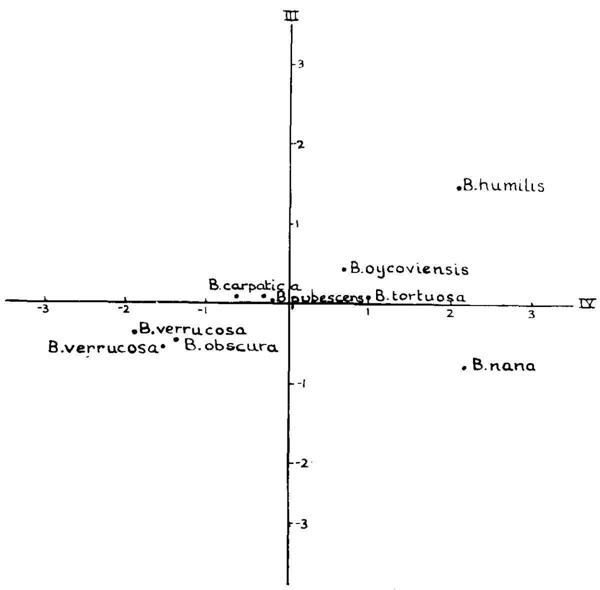

Figure 2. — Projection of Third and Fourth Components.

the linear combinations will represent complex ratios of powers of the original variables. Indeed, exponents of component analysis sometimes claim that all problems should be transformed in this way before analysis.

Transformation and analysis of the data of *table 1* were in fact carried out as an additional part of this investigation. Nine components again accounted for all of the variation contained by the thirteen original variables, the first three accounting for 95 percent of the variation, and the first five for more than 99 percent. Since this transformation provides no essential economy in describing the variation between the groups, no further consideration was given in this analysis to components based on ratios.

Discussion and conclusions

It is of interest here to compare the results of the component analysis with those obtained by Professor Jentys-Szaferowa from her "line of shape". The two sub-species, *Betula verrucosa* Ehrh. and *Betula pubescens* Ehrh. are shown to be two distinguishable groups within the collective species of *Betula alba* L., differing from each other mainly in their values of the first and third components. *Betula carpatica* Waldst. et Kit. and *Betula tortuosa* Ledeb., as suggested by Jentys-Szaferowa, are two further subspecies of the collective species, differing from *B. verrucosa* Ehrh. and *B. pubescens* Ehrh. by a lower value of the first component, and, from each other, by their values of the fourth component. *Betula obscura* Kotula, on the other hand, does not appear to be separable from *B. verrucosa* Ehrh. by any of the characters included in this investigation, and might more correctly be regarded as a variety of *B. verrucosa* Ehrh., again as suggested by the author of the original papers. *Betula oycoviensis* Bess. does not appear to belong to the collective species of *Betula alba* L., being closer to *B. humilis*, but distinct from it in the values of the second, third and fourth components.[2]) Thus, the analysis confirms the observations made in the original papers, and strengthens them by providing unambiguous values by which to make the comparisons.

Given that the two methods, principal component analysis and the "line of shape", have given substantially the same answers, it is fair to ask whether there are any advantages to be gained from the more complex analysis, beyond those arising from more precise quantification of the comparisons between groups. The amount of computation required for the principal component analysis is both greater and of entirely different character to that required for finding the "line of shape". It is probably true to say that the method would not generally be employed if an electronic digital computer were not available, although approximate methods exist for finding at least two of the components. The computations required for the "line of shape" are, however, sufficiently tedious in themselves to make computing aids desirable if the method is to be used extensively, and suffers from the necessity of an arbitrary choice of a 'standard' for any particular identification. Moreover, the resulting polygonal forms are easier to compare if there is a fair degree of correlation between some of the variables, thus increasing the computation necessary by the inclusion of redundant information.

The main advantage of the principal component analysis is that it reduces the number of comparisons to a minimum, and indicates those variables which it is necessary to measure if the system of classification suggested is to be extended to further groups, or to additional specimens of the same groups. Thus, the present analysis has indicated that the thirteen original variables can be reduced to seven without serious loss of information, and that, for all practical purposes, they might be further reduced to only five variables. Examination of the weightings of *table 4* suggest any measure of leaf size, e. g. blade length, together with the axil of the second nerve, the base angle, the apex angle, and the number of leaves on the dwarf shoot as a suitable set of variables upon which to carry out further tests. Measurement of the variables of this small set is very much less formidable than that required for the full original set, and would certainly be more readily entertained. The loss of information through the use of this reduced set would be less than one percent.

Summary

Leaf measurements of a number of groups of the collective species *Betula alba* L., together with leaf measurements of *Betula nana* L., and *Betula humilis* were collected by Professor Jentys-Szaferowa. A principal component analysis has been applied to these measurements in an attempt to simplify the classification of birch species, and to provide a ready means of identification. Five useful components have been defined, and, from these components, Professor Jentys-Szaferowa's observations on the taxonomic status of *Betula obscura* Kotula, *Betula carpatica* Waldst. et. Kit., *Betula tortuosa* Ledeb, and *Betula oycoviensis* Bess. confirmed. Suggestions are also given for the choice of a small set of leaf measurements as a basis for further taxonomic investigations.

Zusammenfassung

Titel der Arbeit: *Analyse der Sammel-Art Betula alba L. auf Grund von Blattmessungen.*

Es waren durch Professor Jentys-Szaferowa Blattmessungen von einer Anzahl von Gruppen aus der Sammel-Art *Betula alba* L., ebenso Blattmessungen von *Betula nana* L. und *Betula humilis* zusammengetragen worden. Eine Analyse der Grundkomponenten wurde nun bei diesen Messungsdaten durchgeführt und versucht, die Klassifizierung der Birken-Arten zu vereinfachen und ein leicht anwendbares Mittel zur Identifikation zu erarbeiten. Fünf brauchbare Komponenten sind definiert und für diese Komponenten die Beobachtungen von Professor Jentys-Szaferowa über den taxonomischen Status von *Betula obscura* Kotula, *B. carpatica* Waldst. et Kit., *B. tortuosa* Ledeb. und *B. oycoviensis* Bess. bestätigt worden. Es werden weiterhin Vorschläge gemacht, wie durch geeignete Wahl kleiner Blattmessungsserien zukünftige taxonomische Untersuchungen durchführbar sind.

Résumé

Titre de l'article: *Analyse de l'espèce collective Betula alba L. sur la base de mesures foliaires.*

Le Professeur Jentys-Szaferowa a réuni des mesures de feuilles d'un certain nombre de populations de l'espèce collective *Betula alba* L., avec des mesures de feuilles de *Betula nana* L. et de *Betula humilis*. Ces mesures ont été

[2]) In subsequent correspondence, Professor Jentys-Szaferowa has questioned the classification of *B. oycoviensis* Bess. suggested by this analysis. She now regards it as belonging to the collective species *Betula alba* L., and being close to *B. verrucosa*, having the same number of chromosomes (n = 28), very similar scales and fruits, similar leaves on long shoots etc. This question clearly needs further study.

analysées dans le but de simplifier la classification des espèces de bouleau, et de fournir des moyens faciles d'identification. Cinq caractéristiques utilisables ont été définies et à partir de celles-ci, les observations de l'auteur sur la taxonomie de *Betula obscura* Kotula, *B. carpatica* Waldst. et Kit., *B. tortuosa* Ledeb., et *B. oycoviensis* Bess. ont été confirmées. L'auteur suggère également le choix d'un petit nombre de mesures foliaires comme base pour de nouvelles recherches taxonomiques.

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A Note on the Variation of Flamy Figure in Silver Birch

(Betula verrucosa Ehrh.)

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Studies made in Perthshire in Central Scotland have shown that the woodlands of natural birch contain individual trees characterised by well-defined flamy figured grain.

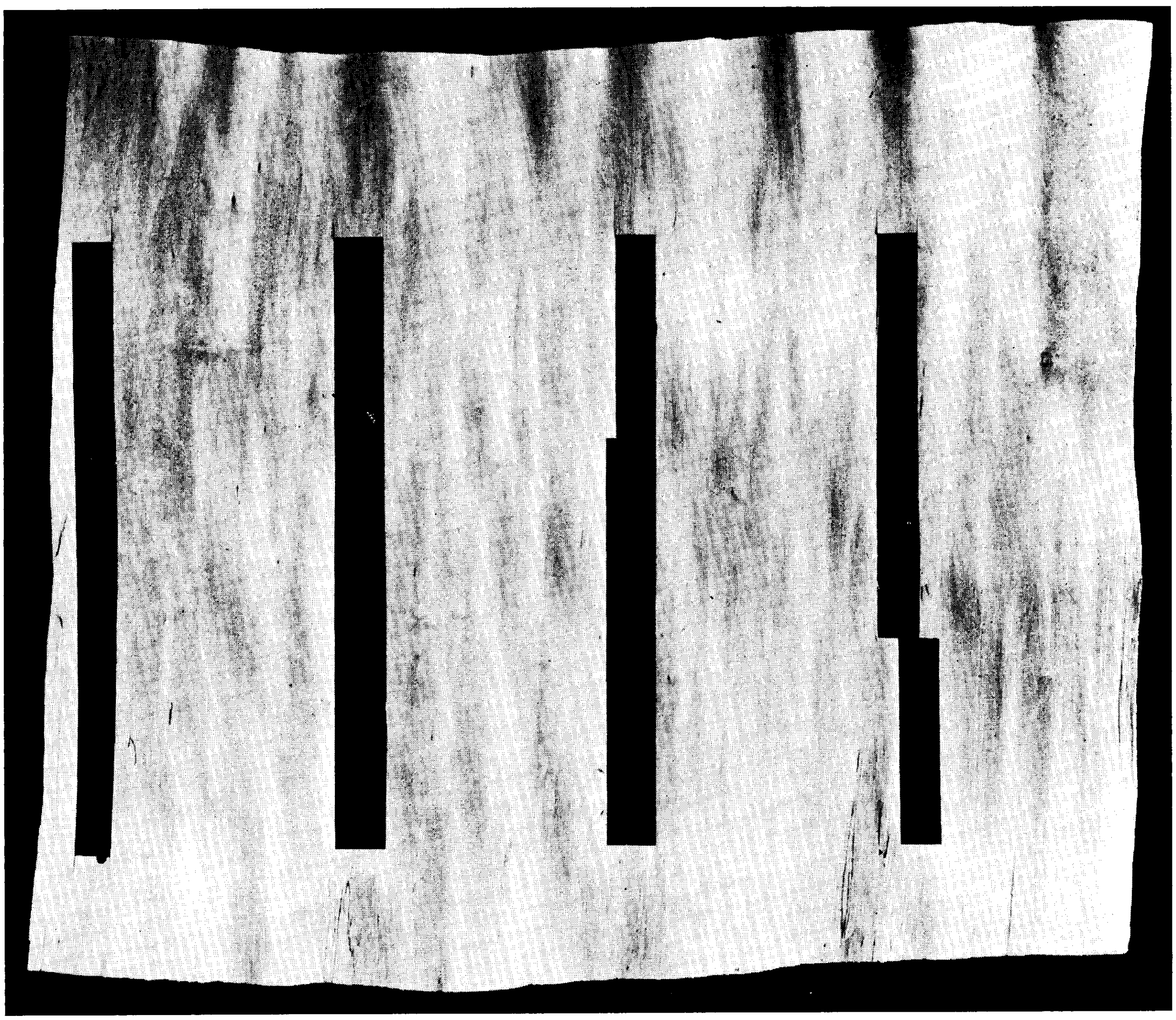

Fig. 1. — A Sheet of Peeled Veneer with Strips Removed. (The slight deviation in the position of the right hand strip was made to avoid a small knot.)