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About the Institute
The Hunt Institute for Botanical Documentation, a research division of Carnegie Mellon University, specializes in the history of botany and all aspects of plant science and serves the international scientific community through research and documentation. To this end, the Institute acquires and maintains authoritative collections of books, plant images, manuscripts, portraits and data files, and provides publications and other modes of information service. The Institute meets the reference needs of botanists, biologists, historians, conservationists, librarians, bibliographers and the public at large, especially those concerned with any aspect of the North American flora.

Hunt Institute was dedicated in 1961 as the Rachel McMasters Miller Hunt Botanical Library, an international center for bibliographical research and service in the interests of botany and horticulture, as well as a center for the study of all aspects of the history of the plant sciences. By 1971 the Library's activities had so diversified that the name was changed to Hunt Institute for Botanical Documentation. Growth in collections and research projects led to the establishment of four programmatic departments: Archives, Art, Bibliography and the Library.

- Taxonomy Laboratory

October 31, 1966

Dr. A. W. Crompton
Director, Peabody Museum
Yale University
New Haven, Connecticut

Dear Dr. Crompton:

Let me express my appreciation to you and others at Yale for an extremely well carried out Centennial. It was a pleasure to participate. I have discovered that my estimates of travel expenses was a bit low. It seems that between the time I submitted my estimate to you and my actual time of travel that prices were raised both for air line fare and ground transportation. I am sending with this letter a statement of additional expenses incurred.

Once again, thank you for your hospitality, I enjoyed it immensely.

Sincerely,

David J. Rogers
Professor of Botany

DJR:ch

Enc.

TRAVEL EXPENSE STATEMENT
for
David J. Rogers

1.	Air Travel (additional)	$ 9.50
2.	Ground transportation—round trip between Fort Collins and Denver (additional)	10.00
	TOTAL	$19.50

– Taxonomy Laboratory

November 1, 1966

Dr. Ralph Richardson
The Rockefeller Foundation
111 West 50th Street
New York 20, N.Y.

Dear Dr. Richardson:

I write to inquire about the possibility of support for my travel to Trinidad next April.

I have been invited to present a paper on Manihot esculenta at the International Symposium on Tropical Root Crops sponsored by the University of the West Indies, St. Augustine, Trinidad. In addition to the invitation for the paper on Manihot, I have been requested to demonstrate computer processing methods for studies of crop plants in general. So far the organizers of the symposium have not been able to supply funds. I would require $582.10 for air and ground transportation plus $210.00 for per diem and expenses for a total of $792.10.

I will be pleased if Rockefeller Foundation could support this travel. I think this is an extremely significant meeting and one that I should definitely attend to summarize our present knowledge of the important tropical crop Manihot esculenta.

Sincerely,

David J. Rogers
Professor of Botany

DJR:ch

- Taxonomy Laboratory

October 31, 1966

Dr. Harold C. Conklin
Department of Anthropology
Yale University
New Haven, Connecticut

Dear Hal:

Enclosed are two copies of the discussions I made during the symposium. If these are not satisfactory for your needs, indicate such and I will revamp accordingly.

In retrospect I think the symposium was an outstanding success. It certainly has broadened many folk's horizons, although I feel the participants themselves are aware of their increased needs for collaboration.

If the symposium accomplished no other purpose, it was extremely valuable to me to get to see Doug Yen. I am terribly sorry that his intensive interests in Sweet potatoes has slacked off, but I think I can understand why. I was also pleased to have the chance to chat with Taylor, the Provost. He seems a great guy. I am sorry that I had already made plans to skip out Thursday. Had I known that you were planning an informal get together on Thursday evening, I would certainly not have made other arrangements. I hope you will forgive me.

My invitation still stands if you care to send any of your students out for an intensive computer-oriented course in how to handle the massive qualitative data needed in ethnological studies. We will be happy to give them the benefit of our thinking in methodology. In the event that we cannot arrange for your students to come here, how would you feel about us coming there for say a week of intensive instructions for your students? This might be more successful and could probably be handled well. Let us pursue this further.

Once again, thank you for a very stimulating meeting. I enjoyed it immensely.

Sincerely,

David J. Rogers
Professor of Botany

P.S. I have sent a statement of additional transportation costs that I incurred to Dr. Crompton.

Enc.

- Taxonomy Laboratory

October 21, 1966

Dr. T. D. Pennington
Forest Herbarium
Commonwealth Forestry Institute
South Parks Rd.
Oxford, United Kingdom

Dear Dr. Pennington:

I am sorry that we have taken so long to return the results of our computer analysis of Meliaceae. I shan't bore you with the multitudinous reasons for the delay, some valid, others not so. However, today we are sending under separate cover, and by surface mail, a rather weighty package. I might mention one problem--we simply did not know your address and had to write to France, in Brazil, to find out where you are. His reply came only yesterday.

You will receive several documents in the package. These are:

(1) The computer print-out.
(2) A mimeographed paper on "How to Read the Printout"
(3) A piece of brown "butcher paper" with two levels of clustering done for you, as an example of the next step in the work.
(4) A reprint of a paper from Systematic Zoology that you should thoroughly digest in order to understand our method.
(5) A mimeographed preprint of a paper which will appear in next month's issue of BioScience, and should be of interest to you.

Item 1, above, has the following included information:

a. Title of the job, and the number of characters and objects.

b. Three lines of zeros, meaningless to you.

c. A line stating "No Matrices in this Study", again of no meaning to you.

d. Main input data. The listing under this heading allows you to check all characters used in the study, for each object (specimen or species). PLEASE NOTE that, for

technical reasons, we had to record any attribute in any character with more than 9 attributes as letters. Thus, attribute 10 in any character is listed as "A", attribute 11 as "B", etc. This should not be confusing.

e. Immediately following the list of input data is a list of objects found to have been coded as identical to other objects. Since they are identical, they are not included in the following part. In the list of identicals you may determine which objects are identical. In the second column are listed the identical objects you will find omitted in the clustering analysis. Do not forget these objects after the study is completed.

f. Next in order is a long table of similarity measures, for each object with every other object. This will be useful to you in interpretation of the clustering results. Note that where you have two objects listed, to find a similarity measure between them, look for the higher numbered object first. Thus, for the similarity between objects 63 and 162, look in the listing where 162 appears, then follow along until you find 63 listed with it. It will appear as follows:

162 63 0.67742 31

The last two numerals, 31, indicate that specimens 162 and 63 were compared on 31 characters.

g. Following the very long table of similarity measures, about 3/4 of the way through the total printout, you will finally find the part that interests you most, namely the clustering analysis. It is at this point that document numbered (2) above will have instructions for you. Even with the computer's analysis, you have much work left to do. However, we have found that this work is extremely instructive, and something the investigator can do better than anyone else. It is unfortunate that so much distance separates us, because we could give you aid and comfort as you proceed with the job. The third document listed above will give you some of the work already, to indicate how you should proceed.

We find that your data is extremely well "structured". This means merely that there are some very clean distinctions between the taxa. Whether the differentiation is pleasing to you or not, is something which we cannot yet determine. Certainly, your work at the family level is similar to Iain's, but shows quite different structure than did that of Irwin on a section of Cassia, and quite significantly different from the intertwined, reticulate structure we find in the cultivars of Manihot esculenta.

We await your reactions to the results with considerable concern. Recall that we entered this work with the idea that we would learn from your data something of the value of the method. We may find new directions from your evaluation of the results which will aid in its improvement. Therefore, please do not consider that there is nothing more than can be done, and this method is necessarily the best, or worst. You can give us assistance in being completely candid about these results. Any comment will be considered by us, and this will be our "pay off."

Sincerely yours,

David J. Rogers
Professor of Botany

DJR:ch

- Taxonomy Laboratory

October 20, 1966

Mr. Harold K. Voris
Division of Reptiles
Chicago Natural History Museum
Roosevelt Road and Lake Shore Drive
Chicago, Illinois 60605

Dear Harold:

Thanks for the post card. We are anxious to hear of the results in more detail as soon as you can say more. If you feel that object 52 should have been removed, it is a simple matter to ignore it and any of its affinities when you are making graph (in my sense of the word), and then later place it "by hand" when a satisfactory classification of the "good" object has been made. Even in classical studies missing information makes the work difficult and in general, I favor not trying to include poor specimens in a machine analysis.

We are getting ready to mimeo a new copy of "How to Read the Printout" which is up-to-date. I am sending you one of these herewith. It should make the job of graphing a little easier for you.

Yours very truly,

George F. Estabrook

GFE:ch

Enc.

- Taxonomy Laboratory

October 18, 1966

Dr. Paul C. Mangelsdorf
Botanical Museum
Harvard University
Cambridge, Mass.

Dear Dr. Mangelsdorf:

I would like your permission to reproduce the table on wheat species which you published in an article in Scientific American in 1953 in my forthcoming popular book on economic botany. One chapter is devoted to wheat and I find that your table summarizes much information for me. I will be pleased to have your acceptance.

Sincerely yours,

David J. Rogers
Professor of Botany

DJR:ch

- Taxonomy Laboratory

October 18, 1966

Dr. Gerard Piel
Publisher
Scientific American
415 Madison Ave.
New York, N.Y. 10017

Dear Dr. Piel:

May I please have permission to reproduce the table of wheat species published in an article entitled "Wheat" in Scientific American by Dr. Paul C. Mangelsdorf in 1953?

I would like to use the table exactly as it is in a forthcoming popular book on economic botany. Of course I will acknowledge the source of the table. I will appreciate your permission to use this table.

Sincerely yours,

David J. Rogers
Professor of Botany

DJR:ch

- Taxonomy Laboratory

October 18, 1966

Mr. Harold K. Voris
Division of Reptiles
Chicago Natural History Museum
Roosevelt Road and Lake Shore Drive
Chicago, Illinois 60605

Dear Mr. Voris:

Thank you for your offer to aid in defraying computer expenses. So far the actual cost of your runs have been very small. Running time for your test case was only 5 minutes 17 seconds. Since this cost is very small, I would suggest that it would be better for us to delay charge for this item until such time as we can combine it with the possible longer run that you will want to make on your data. The longer run (I am hypothesizing that you will want a considerable larger number of objects) combined with the short test run as one bill seems to be the easiest way to handle it.

I trust that the test run has had some merit for you. We will be pleased to hear of your reactions.

Sincerely,

David J. Rogers
Professor of Botany

DJR:ch

- Taxonomy Laboratory

October 17, 1966

Mr. P. H. Haynes
Department of Agriculture-Crop Production
University of the West Indies
St. Augustine, Trinidad, West Indies

Dear Mr. Haynes:

Enclosed please find copies of the abstract for my paper to be given at the forthcoming International Symposium on Root Crops. I trust that a few words over the maximum listed will not be troublesome; otherwise I leave it to your capable hands to edit to the desired number.

I should be grateful to have your reaction to the possibility of my putting on a demonstration of our computer processing methods in more detail. I would like to offer a demonstration which carries through from the data preparation to the final results. May I suggest that this demonstration might be given some evening, and not be a scheduled part of the program. If the idea meets with your approval, then I can provide a detailed outline of the demonstration. Please be certain that I shall not be offended if you have to decline any such informal demonstration, it is merely an idea which I had.

Looking forward to the symposium, I am

Sincerely yours,

David J. Rogers
Professor of Botany

DJR:ch

Enc.

- Taxonomy Laboratory

October 17, 1966

Dr. Jerry S. Kidd
Program Director for
Special Projects Program
Office of Science Information Service
National Science Foundation
Washington, D.C. 20550

Dear Dr. Kidd:

I expect to be in Washington on October 28. I hope I may have a chance to see you then. I shall be coming down from New York and plan to leave in the late afternoon of the same day. Would you please let Dr. Sohns know that I expect to be there that day?

Looking forward to meeting you,

Sincerely,

David J. Rogers
Professor of Botany

DJR:ch

- Taxonomy Laboratory

October 17, 1966

Dr. Richard M. Klein
The New York Botanical Garden
Bronx Park
Bronx, New York 10458

Dear Dick:

I expect to be in New York on Thursday the 27th and would like to see you then. I hope you can make it.

Sincerely,

David J. Rogers
Professor of Botany

DJR:ch

- Taxonomy Laboratory

October 17, 1966

Dr. Howard Irwin
The New York Botanical Garden
Bronx Park
Bronx, New York 10458

Dear Howard:

I expect to be in New York on Thursday the 27th and would like to see you then. I hope you can make it.

Sincerely,

David J. Rogers
Professor of Botany

DJR:ch

- Taxonomy Laboratory

October 17, 1966

Dr. William C. Steere
The New York Botanical Garden
Bronx Park
Bronx, New York 10458

Dear Bill:

I expect to be in New York on Thursday the 27th and would like to see you then. I hope you can make it.

Sincerely,

David J. Rogers
Professor of Botany

DJR:ch

- Taxonomy Laboratory

October 17, 1966

Dr. Pierre Dansereau
The New York Botanical Garden
Bronx Park
Bronx, New York 10458

Dear Pierre:

I am pleased to accept your invitation to ride up to New Haven. I expect to arrive in New York at 3:20 p.m. on the 25th (at Kennedy). With good luck I should arrive at the Garden by 4:45 or 5 p.m. at the latest. Or would you rather I meet you somewhere else? I will call you at the Garden immediately on arrival.

Sincerely,

David J. Rogers
Professor of Botany

DJR:ch

- Taxonomy Laboratory

October 13, 1966

Dr. Sidney R. Galler
Assistant Secretary (Science)
Smithsonian Institution
Washington, D.C. 20560

Dear Sid:

We will be pleased to have you, Dr. Squires and Mr. Suszynski here on December 1 and 2. Let us know when you have your flight plans and I will meet you at the Denver Stapleton Airport. I will also arrange for accommodations.

Sometime between now and the 10th of November, could you give me three sentences (short) which will tell the Sigma Xi group the nature of your talk? Or would you rather I say to the organizer that you will give us a summary of the science activities at the Smithsonian? Any projection equipment required?

Looking forward to seeing you.

Sincerely,

David J. Rogers
Professor of Botany

DJR:ch

- Taxonomy Laboratory

October 13, 1966

Dr. C. F. Konzak
Plant Breeding and Genetics Section
IAEA
Kärntner Ring 11, A-1010
Vienna, I, Austria

Dear Cal:

You did a beautiful job in your letter to Burton Adkinson. I appreciate that boost tremendously.

Also, I appreciate your informative letter of the 5th, particularly the part about USDA's interest in surveying the needs of personnel for ADP. I'll get in touch with Sam Dietz on that. That may be another way to foster this research, and we need to explore all avenues.

Thanks, Cal. I hope we can come through for you.

Sincerely,

David J. Rogers
Professor of Botany

DJR:ch

- Taxonomy Laboratory

October 13, 1966

Mr. Theodore W. Hurst
Worthington, Hurst and Associates
333 N. Michigan Ave.
Chicago, Ill. 60601

Dear Ted:

Whatever happened to you? Did you decide to drop your efforts in this line? Sorry if you did. Let us hear from you.

Sincerely,

David J. Rogers
Professor of Botany

DJR:ch

- Taxonomy Laboratory

October 10, 1966

Mr. John Strother
Botanical Laboratories
The University of Texas
Austin, Texas 78712

Dear Mr. Strother:

I opened your letter to Michael Wirth thinking it might have had some request for reprints of the paper of which he is the senior author. I am returning the letter since I do not have a forwarding address for him. Mike has not been with us since our activities moved to this address. The last known address for Mike was: 4507 20th Rd., Long Island City 5, New York. However, through the grapevine, I have heard he has moved to some small college in Missouri. He has not bothered to let me know. Some time back I sent a reprint to you of the paper. This should have been in your hands by now.

Sincerely,

David J. Rogers
Professor of Botany

DJR:ch

Enc.

- Taxonomy Laboratory

October 7, 1966

Dr. A. W. Crompton, Director
Peabody Museum of Natural History
Yale University
New Haven, Conn. 06520

Dear Dr. Crompton:

Thank you for your letter of the 4th with details of the methods to be followed in the ethnobotany symposium. I had indeed wondered how you would manage to get so many people properly scheduled. Your letter clears this up for me. Certainly the papers by Barrau and Yen are more within my ken than the others.

It will be a pleasure to be there in New Haven.

Sincerely,

David J. Rogers
Professor of Botany

DJR:ch

- Taxonomy Laboratory

October 5, 1966

Director
Herbarium Universitatis Florentinae
Istituto Botanico
Via Lamarmora no. 4
Firenze, Italy

Dear Sir:

I should like to have on loan all of the specimens representing the genus Manihot (Euphorbiaceae), for which I am preparing a world-wide monograph.

I am particularly interested to discover if Dr. Raffaele Ciferri, who presented a classification of Manihot esculenta in 1938, has deposited any specimens of this species in your herbarium. If there are no specimens of Dr. Ciferri's in your collection, could you please suggest where any material used by him may be found?

Specimens sent on loan should be addressed as follows:

Dr. David J. Rogers
c/o Dr. Harold Harrington, Curator
The Herbarium, Botany Department
Colorado State University
Fort Collins, Colorado 80521
USA

Thank you for your attention.

Sincerely yours,

David J. Rogers
Professor of Botany

DJR:ch

- Taxonomy Laboratory

October 4, 1966

Office of International Science Activities
National Science Foundation
Washington, D.C. 20550

Gentlemen:

May I please ask if your office affords travel grants to international symposia. If so, are there any limitations on the symposia supported? Specifically, I am interested to travel to Trinidad to an international symposium on tropical root crops and require support for this travel. If this falls within your purview, may I please have application forms?

Sincerely yours,

David J. Rogers
Professor of Botany

DJR:ch

- Taxonomy Laboratory

October 3, 1966

Miss Anna M. Lee
Department of Biostatistics
School of Public Health
The University of Michigan
Ann Arbor, Michigan 48104

Dear Miss Lee:

Following your telephone call and several letters, enclosed is a corrected flow chart and a program listing. Please pay careful attention to the handwritten instructions on the listing.

I have a copy of my letter to you on July 7, indicating that we had given up on the Information Theory model devised by Tanimoto and me. I suspect that that letter didn't get to you, or else didn't ring a bell with you. The basis of this suspicion was your comment over the phone to me a few days ago. However, be advised that the program we're sending is not the Information Theory model, but is one based on graph theory. It is far superior to the Information Theory model, and accomplishes much more from the biologist's point of view.

Also, with the July 7 letter, I sent a preprint of a paper on the establishment of characters which will be critical if our program is to do the job for you. The gist of this preprint is that there is much needed to be done by the biologist before getting to the clustering program, and no computer can substitute for the biologist's knowledge of his own material, and the proper manner of setting up his data. Such statements can be made no matter what computer method is employed--ours or Sokal's or Sneath's or any of several others. But for our method, the techniques described in the preprint work. I think this is one of the unique features of our method--there is no hand-waving about the input. Follow the instructions given, and you can do a job.

Please also refer to our paper in Systematic Zoology, Vol. 15. This gives you some of the needed background for work with the graph theory model. There are several other items that we could help you with, and for this, I recommend strongly that you find some way to visit us.

Sincerely yours,

David J. Rogers
Professor of Botany

DJRich
Enc.

Taxonomy Laboratory

October 3, 1966

Dr. Harold Conklin
Department of Anthropology
Yale University
New Haven, Conn.

Dear Harold:

Before the symposium on ethnology in connection with the Peabody Centennial, I would like to read something on the history of the Peabody Museum. Could you suggest a source that would give me an overall picture? Perhaps one or two brochures from the museum are available. I doubt that our library here has any such information, though I have not really looked. I would be pleased if you could get some papers off to me shortly.

Thank you.

Sincerely,

David J. Rogers
Professor of Botany

DJR:ch

- Taxonomy Laboratory

October 3, 1966

Dr. Rowena Swanson
Information Sciences
Department of the Air Force
Headquarters Office of Aerospace Research
Arlington, Virginia 22209

Dear Dr. Swanson:

We are pleased to know of your interest in our IR system studies. Again as before, the planning of the operation and the submission of a budget will take time. Please bear with us. I would like to visit with you in Washington towards the end of this month, specifically on or about the 27th or 28th. Are these dates convenient to you?

Sincerely,

David J. Rogers
Professor of Botany

DJR:ch

- Taxonomy Laboratory

October 3, 1966

Dr. Askell Love
Department of Biology
University of Colorado
Boulder, Colorado 80302

Dear Askell:

Thank you for your generous letter of 27 September. I would be very pleased to have your support and to ask your aid in soliciting support from IOPB and IAPT.

Certainly it seems wise to ask Frans Stafleu to come to Colorado. It might be possible to give him some aid through our local chapter of Sigma Xi. But before any commitments can be made, I will have to know when he plans to be in this country and whether we can arrange a date for his talk to this group. Other than Sigma Xi funds, we have none available to us in the Botany Department. For this reason I doubt that we could get additional support to bring Peter Raven here, much as I would like to.

I think that it would be wise for us to get together soon to try to make some arrangements. If you can and feel like doing so, we would like to have you visit us here. This will give you an opportunity to see more of our operations and at the same time allow us to gather the support necessary for the computer program in information retrieval.

Let me know what time is convenient to you and if you can meet us here. If your schedule is very full, I can arrange to meet you in Boulder.

Sincerely,

David J. Rogers
Professor of Botany

DJR:ch

- Taxonomy Laboratory

September 29, 1966

Dr. Sidney R. Galler
Assistant Secretary (Science)
Smithsonian Institution
Washington, D.C. 20560

Dear Sid:

We are, to say the least, very pleased to have your letter of September 23. The opportunities which your visit will undoubtedly open up are some of the most exciting that I can imagine.

From our standpoint, any date convenient to you in the months of November or December is fine. Let me right away put one or two strictures on this time, as follows. We would be very pleased if you could arrange a time for our meeting such that you could speak to the University-wide, Friday luncheon meeting of the local chapter of Sigma Xi. This Sigma Xi chapter is one of the most active in the country, and it is not uncommon to have 250 to 300 members of our faculty at the meeting. I am sure that this group would welcome an opportunity to hear of the Smithsonian's scientific program. The dates we have open for this meeting are: November 4, December 2 and 9.

To get a clear picture of our anticipated IR system, a period of about 12 hours is needed. To do this in one day is a bit too concentrated, and would allow little time for any discussion, questioning, etc. I recommend, therefore, a two-day session on a Thursday and Friday.

Another factor to be considered in time arrangement is the altitude differences between here at 5,000 ft., and Washington's sea level. Not all people are affected by this change, but some are, and one may get a little tired at the end of the day. Variation in individual response is hard to predict. But remember--we have clean air in these parts.

If your schedule cannot be arranged to coincide with the meeting dates of Sigma Xi, please do not let this stand in your way. If you cannot make this conveniently, then any time in November or December would be fine. Non-stop flights from either Dulles or Friendship to Denver are quite convenient. We will meet your plane in Denver.

If you, or others of your faculty who come along, would care to spend an extra day here, we'd be glad to show off some of the spectacular aspects of the local scenery.

Very sincerely,

David J. Rogers
Professor of Botany

DJR:ch

P.S. It would help us if you could give us an early preliminary okay or refusal for the Sigmi Xi lecture.

- Taximetrics Laboratory

November 30, 1966

Dr. Mildred E. Mathias
Dept. of Botany
University of California
Los Angeles, California 90024

Dear Mildred:

I am responding to your recently circulated notice, the Preliminary Report, of the Organization Committee. I note in particular the formation of an Advisory Council.

Since we are in the process of devising a computerized information retrieval system for biology, I thought the committee for the Flora might be interested in knowing of its development. Since we have in mind the kind of system which will be able to handle the hundreds of items of information needed for each specimen that students who will work on the Flora will have to cope with, I thought that it would be profitable to have on the Council at least one person familiar with such techniques.

I know that at the first meetings on the advisability of a North American Flora there was some discussion of the use of the computers for the studies. I fear (from what I read in the report prepared by Bob Thorn) that there was a great misunderstanding of what the proper role of computers might be. I do think that computers can be used in a sort of bookkeeping role, which I think our information retrieval system will provide. If the computer is used to keep track of the miriad specimens, their collectors, the allied information of location of the specimens, dates of collection, etc., etc., the students of the Flora would be relieved of much of the trivial, though important, work needed in the preparation of the Flora.

I have talked about this particular problem with Askell Löve, and he feels very strongly that such a system as ours should be adopted by the committee. If you have any interest along these lines, I could send you descriptive information about our methods, in hopes that it will fill a need.

Sincerely,

David J. Rogers
Professor of Botany

- Taximetrics Laboratory

November 30, 1966

Dr. Ruth Patrick
Chairman, Dept. of Limnology
The Academy of Natural Sciences
of Philadelphia
Nineteenth and the Parkway
Philadelphia, Penna.

Dear Ruth:

I'm glad to know you're willing to have a go with our clustering methods. Below I say a few words about what, why and how. Also, I've included a reprint of an earlier paper, and have marked some pertinent words which may help a bit in preparing your data. But the most significant paper to understand is the one we've already sent as a preprint. (This last paper appeared in BioScience, the November issue.)

As a trial run, and before you commit yourself to a very large task, I suggest that you select a sample of critical specimens from G. parvulum and G. angustatum. In selecting the specimens, pick those with the most complete information, because you can't make a good classification with missing information. How many specimens you select is a matter for your judgment. Without knowing the complexity of the problem, I can only suggest that perhaps the trial could include 50-75 specimens. This is probably sufficient to determine the value of the method. But the suggested figure is no magic number--you could include less if, in your judgment, you could see the effectiveness of the program with a smaller number.

The number of characters you choose to describe each object (specimen, or population sample) is again a matter to be decided by you. We have used as few as 14 characters and 110 states, and as many as 85 with 400 total attributes (states). The upper limit in the program is something like 115 characters, but I have yet to see anyone who used many more than this number. You know what information you want, and no one else can be as good a judge of it as you. Do not assume any statistical technique can dictate how many you have to have. The most significant question to ask about each character is: does it contribute to the task of comparison of the objects?

You could select, say, 15 of the most interesting characters, if you have more, and see what happens to the resulting clusters. You could include 20, putting those you consider the least reliable at the end of the list, and then, after seeing one run, decide to strike out some of the later listed characters, and run it again for comparison. Time for running as many as 100 objects is very short--10-15 minutes at most, so you can play around without the cost becoming prohibitive. It should be noted that the number of characters used for each object has very little influence on the running time--the number of objects included in the study is the time-determining factor.

You may have some difficulty in setting up characters to get the most benefit from our methods. I am referring specifically to those conditions referred to in part III, Considerations of Intrastate Relations, of the preprint we sent earlier. After you have selected your characters, and find that some of them may be structured in one of the ways suggested in that paper, you may want to check with us before coming to a final decision. While we attempted to duplicate the thought processes of taxonomists in character use, when it comes out in black and white, the method seems to be far from anything the working taxonomist does. So, having worked up the method, we can sometimes suggest the most profitable way to structure the character to fit your needs.

A sample coding sheet with instructions is included.

I hope this information gets you started--but please feel free to query us on any doubtful point. We want to help out.

Sincerely,

David J. Rogers
Professor of Botany

DJR:ch

- Taximetrics Laboratory

November 30, 1966

Dr. Howard P. Jenerick, Chief
Research Grants Branch
National Institute of General
Medical Sciences
Department of Health, Education,
and Welfare
Bethesda, Md. 20014

Re: GM13974-02

Dear Dr. Jenerick:

I am sending herewith the following: (1) one copy of a General Write-up for Similarity-Clustering Program, (2) one listing and documentation for this program, (3) a tear sheet of an article just out in BioScience, and (4) 10 copies of a recently published paper. I would like to consider this as a sort of interim report on our grant GM 13974. Documents one and two we consider to be one of the major efforts of this laboratory and items three and four are explanatory pieces accompanying the first two. Items one and two are being submitted to the IBM SHARE Library for the 7044 computer users group. This insures the widest possible dissemination of this program. I have not sent more than one copy to you because of the cost involved in preparing them, but if more are needed, I will try to supply them.

I have a question concerning travel funds on our present grant. We are allotted $600 for domestic travel. Is it possible to use $400 of these funds for a trip to Trinidad next April? There is an international meeting to be held at the College of Tropical Agriculture at which I would like to present the results of our studies in computer classification before an audience that I believe to have great need of our methodologies. I am expecting to have some assistance for this travel through the organizing agency but will not be able to cover all costs from that source. For this reason, if it is possible to use domestic travel funds already granted for this internation travel, I will appreciate it.

Sincerely yours,

David J. Rogers
Professor of Botany

DJR:ch

- Taximetrics Laboratory

November 29, 1966

Miss Helen L. Hayes
Biology Branch
Office of Naval Research
Washington, D.C.

Dear Miss Hayes:

Enclosed is one copy of the program listing and documentation, and a flow chart of a similarity clustering method. This is sent because it was through the good offices of the Office of Naval Research that we were able to begin studies that have culminated in the enclosed computer program. I am also enclosing 10 copies of a paper describing the biological aspects for which the program was written. I have not enclosed more copies of the flow chart and program because I did not feel that it would be useful for you to have more than these. I should tell you that we have submitted the program to the SHARE Library of IBM for 7044 users. This should insure wide dissemination of this program and make it as available as possible to many workers.

We definitely appreciate the support given us by ONR and trust that the resulting work has justified the expenditure of those funds.

Sincerely yours

David J. Rogers
Professor of Botany

DJR:ch

Enc.

- Taximetrics Laboratory

November 28, 1966

Dr. F. A. Stafleu, Editor
TAXON
106 Lange Nieuwstraat
Utrecht, Netherlands

Dear Dr. Stafleu:

We are pleased to have your acceptance of Mr. Estabrook's paper.

Any way that you wish to handle the footnotes is satisfactory with us.

Best wishes for the coming season,

Sincerely yours,

David J. Rogers
Professor of Botany

DJR:ch

- Taximetrics Laboratory

November 28, 1966

Dr. A. W. Crompton, Director
Peabody Museum of Natural History
Yale University
New Haven, Connecticut 06520

Dear Dr. Crompton:

I was delighted to receive a copy of the Verrill Medal, and to have a small part in the Centennial Celebrations. Let me congratulate you and others responsible for the convening of an exciting group of symposia and speakers.

It is good to see the museums again taking the lead in research. For some time (in this country, at least) museums have been followers, rather than leaders, but Peabody and others now seem to have a new lease on life. I am sure that part of the difficulties in the past were financial, but this could not altogether explain why the museums were in the doldrums. Now, however, I sense that there is some excitment in halls, and new efforts and directions, such as yours, will produce much of value to the old fields of ethnology, anthropology and biology.

Once again, thank you for the Medal and the opportunity to participate in the Centennial.

Sincerely yours,

David J. Rogers
Professor of Botany

- Taximetrics Laboratory

November 28, 1966

Publisher
New York Times
New York, N.Y.

Dear Sir:

Amongst the various fantastic statistics used to describe the Times, I have heard (or read) that 400 acres of timber are needed to produce the paper to print each Sunday edition. But I cannot at the moment recall where I found this statistic, nor remember whether the number was 200? 300? 500?

I am sure that you have many things to do besides answering such questions, but I would deeply appreciate your corroboration or correction of the above cited figure. I have included this statistic in a manuscript for a little book for popular consumption on the modern uses of various plant materials, and I would like to be as correct as possible.

Thank you for your assistance.

Sincerely yours,

David J. Rogers
Professor of Botany

- Taximetrics Laboratory

November 22, 1966

Dr. David Gates
Missouri Botanical Garden
2315 Tower Grove Avenue
St. Louis, Missouri

Dear Dr. Gates:

I am writing to inquire about the possibility of publishing a rather longish monograph of Manihot esculenta in the pages of the Annals. The work I propose to publish is the first computerized classification of a group the size of mine (about 500 cultivars) yet attempted. It is also among the first modern systematic, morphological analysis of a group of cultivars of a single species.

As I see it, the monograph should be in two parts, the first of which discusses the methods used, and the second, the actual results of the methods. I would indicate the values of the computer methods, and some of the new insights about the plants which result from the clustering methods employed.

I have had to develop a series of new methodologies for work with cultivar classification, from the part of specimen and data collection, through data correlation, to the designation of the various hierarchical levels to be employed within a group where the relationships are highly reticulate. Discussions of these methodologies would also be included.

Since my work has already been subsidized by NSF, NIH and ONR, I shouldn't think there would be any difficulty in getting financial assistance for the publication. But this is premature to the immediate problem of knowing your interest in such publication in the Annals. I have not commenced writing the monograph, but the whole will probably not exceed 100 printed pages.

Sincerely,

David J. Rogers
Professor of Botany

DJR:ch

- Taximetrics Laboratory

November 21, 1966

Sr. Milton de Albuquerque
Seccao de Fitotecnia
IPEAN
C. P. 48 Belem,
Para Brasil

Dear Milton:

I am sending a copy of the bibliography you requested in your recent letter.

I have set the bibliography up under the following headings: chemical analysis, cultivation, disease, distribution, ethnology, general, taxonomy, technical, uses. Some of the references will apply to more than one of these headings, but they are listed only once.

Please be aware that the references may not be entirely correct. I have not thoroughly checked each of them to see whether they have the correct volume and page numbers, nor whether the author's names are all correct. However, I think there is sufficient accuracy for you to find all of them. I hope this proves to be useful to you.

Very sincerely yours,

David J. Rogers
Professor of Botany

DJR:ch

Enc.

EXPENSE ACCOUNT

To participate as a discussant in the Centennial Celebration of the Peabody Museum of Natural History, October 25-28, 1966.

Original estimated expense account:

Plane Fare	$217.50
Ground Travel & Misc. Expenses	22.50
TOTAL	240.00

Additional expense account:

Air Travel	$ 9.50
Ground transportation - round trip between Fort Collins and Denver	10.00
TOTAL	$ 19.50

Total amount received $259.50

Attached: Plane Fare receipts (United Air Lines $199.50 and Eastern Air Lines $18.00)

David J. Rogers

- Taximetrics Laboratory

November 21, 1966

Mr. Jake Page
Natural History Press
American Museum of Natural History
Central Park West and 79th St.
New York, N.Y. 10024

Dear Jake:

I have recently been through the total manuscript "Methods in Botanical Research" for the Plant Science Series by Richard and Deana Klein. Perhaps you have heard from Dick that it is long. I don't know whether you are aware of how long, but it is well over 800 ms pages, without illustrations, figures, references and index.

Before I left New York, we briefly discussed the fact that this work should not be judged in the same category as others to be included in the Series, but I do not recall that we did (or could) make any decision at that point on how to handle this monster. But now we have a rough draft (or perhaps a little farther along than rough draft), and something will have to be decided.

I have been in touch with Dick regularly on the work (I won't call it a book, because it is more like four) and haven't reached any decision. My recommendations to him have been (1) that for the audience intended originally in our series, he has entirely too much and too complex a book and that he should cut out large portions, reduce the complexity and scope of the experimental descriptions, (2) that two separate series are represented, one good enough for undergraduate college audiences, one just about right for the high school audience. (To clarify this second recommendation: In Dick's and Deana's special areas, physiology and mycology, they are very complete, very accurate, and require a bit more background than I feel the high school student (or even his teacher) would have, but in areas not of their specialty, they have written things that high school students could certainly handle easily. One of these is in the area of taxonomy. If they had introduced methods as complex in taxonomy as they have in the biochemical and functional areas, they would have had to write still another six chapters.)

Whatever the final outcome, their book(s) are vital to this series. I think that a much abridged form is required for the Series, but I also think the unexpurgated version should appear in a hard-back publication.

And again, whatever the final outcome, there is going to be much more editorial work to be done. Editing such a work is extremely difficult. I do not feel that the original editorial fee is sufficient to cover the job, and to get it done, some financial adjustments are going to have to be made. Having gone as far as I have working with the Kleins, I feel in a better position to do the job than would a person coming into it at this stage of the game. But I am not willing to continue until we have made these adjustments. I hope we can work out something, and that you understand my reasons. Let me hear from you soon, because it is now time for some decisions to be made.

Sincerely,

David J. Rogers
Professor of Botany

DJR:ch

- Taximetrics Laboratory

November 17, 1966

Dr. Wm. Bridge Cooke
1135 Wilshire Ct.
Cincinnati, Ohio 45230

Dear Bridge:

Following our telephone conversation, I checked with Henry Fleming who had the opportunity to talk with you last summer about your particular interests. After talking to him, it turns out that my estimation given over the phone fell somewhat shy of the needs. Inasmuch as your requirements will take some additional research on our part, I am sending herewith a preliminary budget which indicates, (1) our contributions to your project and, (2) what will be needed from you. These are not final figures but they are estimations made on the basis of past experience and should not be too far out.

What we will do for you:

1. Develop a program specifically designed for your yeast identification.

2. Make tests and trial runs on your data as demonstration of the method.

What we cannot do under this contract is to continue as a "service bureau" once the programming is complete. You may wish to consider that problem with your fiscal authorities when we complete the research work.

Note that the budget has: no travel funds for us and no funds needed by you for your own work or travel.

Let me know what the possibilities are for this work.

Sincerely,

David J. Rogers
Professor of Botany

DJR:ch

OUR CONTRIBUTION

1. Biological analysis of the problem	
a. establishment of the needs in a key program	
b. setting the limits or rules for such programming	$10,000
2. Interpretation of the program	
a. how the computer key program works	
b. what are the "side benefits" of the key program	10,000
Total contributions on our part	$20,000

NEEDED FROM YOU (your contributions)

1. Research requirements	
a. development of algorithms	$ 5,000
b. programming	5,000
c. checking out the program (debugging)	2,000
d. testing the classifications of yeasts separately and merged	1,250
2. Consulting	1,000
3. Punch operators and secretarial time	1,500
Total direct costs	$15,750
4. Overhead 42%	6,615
Total costs	$22,365

- Taximetrics Laboratory

November 16, 1966

Dr. P.H.A. Sneath
MRC Microbial Systematics
Research Unit
Leicester University
Leicester, England

Dear Peter:

At long last I am acceding to your request for documentation, flow charts, as well as a reprint of our graph theory clustering method. I am also enclosing a mimeographed copy of "Reading the Printout." With these documents you have as complete a set of instructions as I can put together. Since this documentation flow chart was done on an IBM 7044, it should be perfectly compatible with an IBM 7090 which I understand is available somewhere in the U.K. The flow chart is sufficiently well constructed and the documentation sufficiently complete, such that it should be easy to convert to other hardware.

I hope that we have sufficiently acknowledged your contributions. If not, please be assured that I recognize them. May I ask you about notification of this program to be made in Taxometrics or in some similar news bulletin for those interested in such methodologies. I am sure that Taxometrics does not wish to reproduce all that we have sent you. It might be appropriate, however, to take the comments for each of the subroutines, extract them and print those in Taxometrics. Would you be kind enough to suggest to Hill (or whoever is running Taxometrics now) that he take these comments and publish them? This should give interested workers enough insight to decide the applicability of this method.

Another document is also included. This is a preprint of a paper to appear shortly in BioScience entitled "A general method of taxonomic description for a computed similarity measure." Since the computer method is very sensitive to the data structuring, we have addressed ourselves to this problem in this paper. Anyone who attempts to use the method would be best served to consider the suggestions made for data structuring given in this paper.

We have tested the method on several different groups of organisms using data supplied to us by other workers. Two of the workers whose data we have tested are countrymen of yours. One you know quite well,

Dr. Stearn, of the British Museum. Unfortunately, Dr. Stearn has not so much as acknowledged the receipt of our printout so we do not know if he is dissatisfied with the outcome or not. The other is a young man, G. T. Prance, whose degree is from Oxford and who for the past several years has been working at the New York Botanical Garden. His study on the genera of the Chrysobalanaceae was a comparative one in which he employed several computerized methodologies for clustering. The results of his work are in the press in The New Phytologist. Other studies of this size group are in various stages of preparation for publication. Our effort has been to explore the value of the method in a rather broad spectrum, to discover where we may improve.

I trust that this methodology will be useful to you. I will welcome your comments and questions.

Sincerely,

David J. Rogers
Professor of Botany

DJR:ch

Enc.

- Taxidmetrics Laboratory

November 15, 1966

Dr. Robert Breach
New York Botanical Garden
Bronx Park
Bronx, New York 10458

Dear Bob:

I have been meaning for some time to ask if an old editor of EB could pry loose all of the issues of Volume 17, 1963. Somewhere, somehow my bound volume got lost even before we left NYBG. I frankly don't feel like paying Stechert-Hafners costs on that. However, if you can't spring loose those four issues for me, I will pay for them. Let me know if you can hack it. Thanks.

Sincerely,

David J. Rogers
Professor of Botany

- Taximetrics Laboratory

November 15, 1966

Mr. Henry L. Woudhuysen
Science Editor
3343 Sedgwick Avenue
Bronx, N. Y. 10463

Dear Mr. Woudhuysen:

I fear that the answers that you seek in your letter of November 9 are beyond me to give. To take a " new look" at the origin of cultivated plants would require much more than editorial advisory board in my estimation. What is needed is another Vavilov who could demand and get a whole experiment station devoted to the multitudinous endeavors required to carry forward any further investigation. There are, in addition, crying needs for an endeavor which I term archeoethnobotany. I know of only one person at the moment who is carrying out such research. He employs the team approach. He is R. S. McNeish, now I believe at the University of Saskatchewan. His efforts probably will lay good foundations under the studies of the origins of economic plants.

Combine McNeish with Whitaker, Mangelsdorf, Stebbins, Schwanitz, Hutchinson, Yen, C. B. Heiser, and a few others and you might have something to talk about.

We have about mined all the gold that we can in general studies. Now we need specific research and this is a long costly affair. I may be wrong, but I don't think we are ready for another "origin of cultivated plants."

Sincerely,

David J. Rogers
Professor of Botany

DJR:ch

Taximetrics Laboratory

November 14, 1966

Dr. Sidney R. Galler
Assistant Secretary (Science)
Smithsonian Institution
Washington, D.C. 20560

Dear Sid:

I enclose herewith two copies of the following:

1. a preliminary write-up and description of our information retrieval system.

2. a preprint of a paper "A General Method of Taxonomic Description for a Computed Similarity Measure."

These two will, I hope, give you and the others some background before you get here. The first is a part of a proposal we are preparing for the Office of Science Information Services, NSF. In it you will find a rather sketchy account of the computer methods to be done, as well as the design of the input to the computer.

The second paper is more intended for the biologist than for the computer expert, though the latter will find it helpful in the considerations needed to structure the input. While this paper describes a method of data structuring for another of our projects, the clustering method which really came to fruition through your efforts, the main point in sending it now is to give background reading for the method we intend to develop more fully for the IR program.

Would you please route these to Squires, et al.?

It is our intent, during your visit, to flesh out the whole procedure with the computers and with the input. We will spend some time on December 1 with the sturcturing of the input with sufficient biological discussion to be meaningful to you and Squires particularly. Following this, we will then give the details of computer activities, and this portion should take up the rest of the time.

We have you scheduled for the Sigma Xi lecture on Friday, Dec. 2. Looking forward to your visit.

Sincerely,

David J. Rogers
Professor of Botany

DJR:ch

Enc.

- Taxonomy Laboratory

November 14, 1966

Professor Daniel W. Gade
Department of Geography
Old Mill Building
The University of Vermont
Burlington, Vermont 05401

Dear Professor Gade:

The reprints requested are being sent. With respect to your comment on the collections of "sweet cultivars" in Peru and the statement by Weberbauer on the bitter manioc, there are no considerations in my estimation which can make any geographic differentiation between the "sweet" and "bitter" variations. I make some comments about this in these papers.

Sincerely yours,

David J. Rogers
Professor of Botany

DJR:ch

- Taxometrics Laboratory

November 14, 1966

Dr. Jerry S. Kidd
Program Director for
Special Projects Program
Office of Science Information Service
National Science Foundation
Washington, D.C. 20550

Dear Dr. Kidd:

A question has arisen as I go about the final write-up and preparation of a budget for our IR demonstration. One item you requested, and one that I think is a fine idea, is an evaluation of the procedures. Since I do not know how to go about this personally, I talked to an economist on the faculty here, and he suggests a two-step evaluation. The first step is a direct measurement of the costs—how much for input, and how much per "unit" of output. This step can best be done by a cost-accountant, and we have such a person on campus who is interested in doing this type of work. The second step is an impact study—how and where does this program fit in the larger framework of the sciences, and what are its benefits to our economy. This work is best done by an economist, and again, we have a faculty member here at Colorado State University interested in doing this job.

My question is whether or not this is what you had in mind when you suggested an evaluation of the IR program. Though it will add to the cost of the program, I feel that it will be well worth-while, and give you a much more practical evaluation than we could do without these added personnel. Please let me know your reactions to this addition to our project.

I have enclosed with this letter a copy of a program, documentation, and flow-chart of an earlier similarity-clustering method developed in this lab. The purpose of sending it is to give you and the computer people in NSF a further indication of the capabilities of our group. It is not a program to be used in the IR system. I believe, however, that Larry Oliver may have some interest in it for his own project, and I would be pleased if you would show it to him.

Sincerely,

David J. Rogers
Professor of Botany

DJR:ch
Enc.

- Taximetrics Laboratory

November 9, 1966

Dr. F. A. Stafleu, Editor
TAXON
106 Lange Nieuwstraat
Utrecht, Netherlands

Dear Dr. Stafleu:

Some time ago you suggested that if we had a paper appropriate to Taxon, and concerned with some aspect of computer work, that I should submit it for publication. I forward herewith a manuscript by one of my staff members, Mr. George Estabrook.

The manuscript describes an interesting new mathematical model for testing the value of characters used in a classification. I have guided the writing of the paper to make the text more understandable to biologists, and have, as you can see, kept the mathematical expression separate from the main body of the work. We feel very strongly that the mathematical argument is a vital portion of the work, though we know that few biologists have the appropriate training to follow that argument. However, sufficient numbers of readers will be able to understand it, and want to have the mathematics available to them, to justify its appearance in connection with the other parts. I trust that you will agree.

May I ask about the policy for review of the paper? My reason for asking is that we know that reviewers may, or more likely, may not understand the mathematics sufficiently to properly evaluate the work. Since this is a type of mathematics different from statistics, it would not be justifiable to send the paper to a reviewer competent only in the field of statistics. Since most biologists, if they be competent in a field of mathematics at all, are most likely trained in statistics, it is difficult to find the appropriately trained person. I know of only a few persons with sufficient background to evaluate the new field of information theory. But to get the best results from a reviewer, these persons should be consulted.

I trust that you can accept this paper. Any correspondence concerning it should be addressed to me.

Thank you for your consideration.

Sincerely,

David J. Rogers
Professor of Botany

DJR:ch

- Taximetrics Laboratory

November 7, 1966

Mr. R. Gordon Wasson
42 Long Ridge Rd.
Danbury, Conn.

Dear Mr. Wasson:

Enclosed is a photo of Amanita which may be of interest to you. The specimen was growing in an open grassland with scattered pine trees at 8,500 feet. The climate was cool and damp(at least when we were there in July). There was no evidence of habitation for some distance, although I am sure there were numbers of people living in the vicinity. The locality is along the highway which connects the city of Durango and Mazatlan in the state of Sinaloa.

I hope this is useful to you.

Sincerely,

David J. Rogers
Professor of Botany

DJR:ch

Enc.

- Taximetrics Laboratory

November 7, 1966

Dr. Ruth Patrick
Philadelphia Academy of Natural Science
Philadelphia, Pa.

Dear Dr. Patrick:

It was indeed a pleasure to see you at the Yale symposium. I have only one regret that we did not have longer to chat. I think I promised to send you a copy of a paper of ours that has something to say about the structuring characters to be used in our clustering method. Perhaps you will find this of interest. I am also enclosing a discussion of our graph clustering technique.

We have found this clustering method extremely useful. It is now programmed and has been used in a number of interesting applications on groups of organisms as diverse as strains of streptomyces to a subtribe of orchids. I have used it myself for Manihot esculenta and am now satisfied that I have a classification of the cultivars. This latter, of course, has been uppermost in my mind in the development of any computer methods.

If you are interested in testing this program, we could accomplish this in one of two ways. We here at Fort Collins could run your data through our hardware and send you the results. Or two, you could reprogram for whatever computer facilities are available to you there. Of the two courses, I recommend the former, purely because of the great difficulty in getting a new program transferred from one machine to another. It is no simple task, since this program is in the words of my mathematician "a nontrivial task." I do not recommend the job of the transfer to another computer unless the computer be of the same configuration and number as the one for which the program was originally written.

I would be very happy to collaborate with you on some problems amongst the diatoms.

Sincerely,

David J. Rogers
Professor of Botany

DJR:ch

Enc.

- Taximetrics Laboratory

November 4, 1966

Sr. Milton de Albuquerque
Seccao de Fitotecnia
IPEAN
C.P. 48 Belem,
Para Brasil

Dear Milton:

I was very pleased to hear from you on your letter of 26 October. I will send to you as soon as it is completed a copy of all the references that I have accumulated on mandioca.

In the meantime, you have my permission to use my paper on the amino acids in any way you choose. I am sending two or three copies of the paper with this letter.

I am sorry that I have not had an opportunity to visit you again. I really want to visit there but have been very busy completing the classification of M. esculenta. I think I will be finished with this classification within the next few months.

I expect to visit Trinidad next April 2 - 8 at the University of the West Indies, St. Augustine. There is a meeting at that time for The International Symposium on Tropical Root Crops. If you have not been advised of this meeting, I suggest you contact Mr. P. H. Haynes of the Department of Agriculture-Crop Production. It would be very nice to see you there.

I trust that I shall be able to send you the Manihot bibliography within the next few weeks.

Very sincerely,

David J. Rogers
Professor of Botany

DJR:ch

Enc.

- Taximetrics Laboratory

November 3, 1966

Mr. Mark Halpern
Dept. 52-40, Bldg. 201
Lockheed Missiles and Space Co.
Palo Alto, California 94304

Dear Mark:

Since we last communicated, the preliminary information retrieval proposal has been going through the mill at NSF. Dave just returned from Washington with some unofficial encouragement from NSF and a few hints about how to present the formal grant request. They would like (1) to see a more detailed explanation of XPOP, and (2) to know if there are any systems in operation or in blueprint which are competitive with XPOP.

If we can sell NSF our IR plans at all, I'm sure they'll take our word in the end that XPOP is the system we should build on, but it will go down better in the formal request if we present a brief comparative study. I think I can handle point one above, but would certainly welcome your suggestions. I turn to you as the leading compiler-compiler expert for help with point two. In your paper XPOP: A Metalanguage, etc. you cite 3 projects which are at least in spirit similar to XPOP. Any help there? Anything new since then?

Sincerely,

cc: D. J. Rogers

- Taximetrics Laboratory

November 3, 1966

Dr. Geoffrey H. Ball
Radio Systems Laboratory
Stanford Research Institute
Menlo Park, California

Dear Dr. Ball:

Enclosed are the reference materials requested in your recent letter. I was pleased to receive your review of the clustering procedures.

You will find in the enclosed reprint an entirely different clustering procedure developed by this laboratory. The graph clustering method is described more from its biological standpoint than from the basic mathematical descriptions. This aspect is covered in a separate publication we hope to have out in the near future. This paper will be of great value to you, and I shall add your name to our list to receive this descriptive material when it appears.

With regard to your form for specification of any cluster seeking technique, I fear that I cannot do it justice without some descriptive literature to accompany it. Precisely, I am not certain what to say about the first mentioned word "data", nor how to say anything about "operations on data." I think you need some sort of additional sets of directions to fill in the various categories.

Would you be so kind as to take our enclosed paper on graph-clustering methods, fill out your form as an illustration of the required information on the form. From that point, perhaps I can decide what is needed.

With regard to your request to CDC for a documented program, we now have a very detailed, documented listing, flow chart and instructions for input, written for an IBM 7044, mostly in FORTRAN IV. If you are interested, I think we can do better than CDC's charge for that service.

Hope these comments are useful to you.

Sincerely,

David J. Rogers
Professor of Botany

Enc.

- Taximetrics Laboratory

November 3, 1966

Dr. Warren H. Wagner, Jr.
Director, The Botanical Garden
University of Michigan
Ann Arbor, Michigan

Dear Herb:

Thanks for the reprints.

What has happened to one of your advisees, Anna M. Lee? We sent her a big, long, detailed flowchart of our computer program, and have not had an acknowledgement of it. To refresh your memory (if that need be) she is in the Department of Biostatistics, working on influenze virus.

Come see us sometime.

Sincerely,

David J. Rogers
Professor of Botany

DJR:ch

- Taximetrics Laboratory

November 3, 1966

Mr. Lauren B. Doyle
Language Processing and Retrieval Staff
System Development Corporation
Research and Technology Division
2500 Colorado Ave.
Santa Monica, California 90406

Dear Mr. Doyle:

Please excuse my long delay in answering your cordial letter of September 21. First of all, you will note that I and my staff have moved from New York (in September, 1965) and are now a part of the botany department of Colorado State University. The forwarding of your letter caused some loss of time in answering, but cannot be blamed for all of it. We have been extremely busy this fall seeking research funds to continue our work, and this is a nontrivial task because the education of the granting agencies to "see the problem" as we do is not easy. It is too bad that I did not attend the meetings of the ADI, an organization that I should be closer to, but you can understand, I hope, that one's allegiances shift slowly from one group of scientific societies to another.

It is certainly true that I do not have the knowledge, or skill, to follow all the various developments for information retrieval wherever these developments are made. Your area, for example, does not usually get indexed in the various journals I read. Good thing that the NSF document did put us in contact.

Frankly, we did not see the value of our work on the broad general scale that other (including you) have see it. We were (at first) only concerned with biological classification, and we still stick to that as our primary source of inspiration. We have become aware of the really great potentials for general information retrieval problems which can be derived by careful examination of the biological classification process. Though the biologists generally use their classification tools in an intuitive way, we have found many procedures which can be put into logical sequences, rules and algorithms developed, and computer programs written. There are several more programs running that we have not yet reported on, largely for the want of sufficient personnel, time and money. All these programs are generated in the general framework of the classificatory disciplines of biology (classically called taxonomy), and all seem to have merit for the general field of literature classification, and eventually for information retrieval.

I am sending a flow-chart of taxonomy which we put together mostly for our own benefit, but reading of this chart will give you some feeling of the various bits and parts of the total biological classificatory effort. Each of the areas has some special role to play, and we hope eventually to design programs for each of the areas, each merging with the others. However, to design the programs, we have much mathematical work to do, as well as much biological analysis to test the effects of the mathematical logic. My team is integrated with this type of endeavor uppermost in our minds. The team includes two biologists, one mathematician and one programmer. The latter two are only half-time members, and we need more of their time to really do the job I know has to be done.

Our efforts will take much time to spread through the various areas of science where they will be recognized as meritorious outside the strictly biological disciplines. We have found acceptance within the biological milieu in only a few places, but more and more people are coming into the fold. I trust that through efforts such as yours we can hope for wider acceptance sooner. I am sending you some papers you may find interesting, and have your name on our mailing list to receive other works now in the mill.

Thank you for your initiative in writing. I hope we can get together soon.

Sincerely,

David J. Rogers
Professor of Botany

DJR:ch

ONR - Gen. Corr.

- Taximetrics Laboratory

December 28, 1966

Miss Helen L. Hayes
Biology Branch
Office of Naval Research
Washington, D.C.

Dear Miss Hayes:

Enclosed are six copies of a paper recently published in BioScience. Due to an editorial mistake, the footnote was omitted which gave credit for the work done under Contract Nonr 3640(00).

Sincerely,

David J. Rogers
Professor of Botany

DJR:ch

Enc.

NIH - Gen Corr.

- Taximetrics Laboratory .

December 28, 1966

Dr. Howard P. Jenerick, Chief
Research Grants Branch
National Institute of General
Medical Sciences
Department of Health, Education,
and Welfare
Bethesda, Md. 20014

Dear Dr. Jenerick:

Enclosed are six copies of a paper recently published in BioScience. Due to an editorial mistake, the footnote was omitted which gave credit for the work done under Grant number GM13974-02.

Sincerely,

David J. Rogers
Professor of Botany

DJR:ch

Enc.

Scientific paper reviews

- Taximetrics Laboratory

December 28, 1966

Dr. Arthur Cronquist
The New York Botanical Garden
Bronx Park
Bronx, New York 10458

Dear Art:

This paper suffers from the same problem that so many taxonomists fall into when they attempt to use some "quantitative" methodology. First, it is not clear what the author wants to do. Does he want to show that species of Antennaria are rather arbitrary? Then the paper does no more than illustrate the obvious. Second, there is no reason given, mathematically, for selecting one technique rather than another. Third, he has not really grasped the significance of one or another method which he mentions in the way of a summary of "numerical taxonomy." To take but one example, on p. 3 (bottom) in reference to my 1960 paper, "but these were more or less representative of known varieties." How the hell did he figure that anyone knows a variety in this complex? What definition is there for the taxon "variety", with relation to cultivated plants? He states that (last sentence, p. 3) "All of this work has assumed clustering of individuals or taxa in "phenetic space." That simply is not true. We, particularly, have not assumed a cluster. He has either not seen, or for some reason chooses to ignore, our more recent clustering method published in Systematic Zoology this year. While he does not want to use a computer and we do, he still could get through a test for his Antennaria had he followed that methodology. I'm not pushing him into this method, but he should have used a more recent citation for work done by our group. The 1960 paper is way out of date.

The real masterpiece of obfuscation occurs at the top of page 3— "Because of the relative simplicity of the confusion of this group, etc."

He has chosen for his work a similarity measure called the MCD. While this is permissible, he then garbles the whole by adding a discussion (bottom of p. 5) about correlated versus uncorrelated characters. Nowhere does he define correlated or uncorrelated, or show how to discover them. The limitation of the method chosen is indicated by the fact that he cannot find a way to use qualitative characters, such as those mentioned on p. 12, "shape of leaf margin, pubescence, glands, and bract shape."

Now to quit knocking the paper, and say something good about it. In his discussion, he recognizes (as you did) that for taxonomic purposes, you probably can't recognize more than two taxa, but for those interested in the biological mechanisms to be found in the group, there are discernable differences caused by polyploidy, apomixis, and the like. This is a good way to do taxonomy, in my estimation, i.e., don't recognize the instability and clutter up the nomenclature with formal names for fleeting variation.

The ordination technique apparently works in discovering the variations amongst the plants studied. It is a heuristic technique, not one based on sound mathematical logic. This is not necessarily bad, but we never will develop ourselves until we quit using the approach that says "let's try this method--maybe it has something in it that we can use."

On another subject, we received your Christmas card, and were pleased to have it. Happy Hanukka to you!

Sincerely,

David J. Rogers
Professor of Botany

DJR:ch

Enc.

Computer corr.

- Taximetrics Laboratory

December 22, 1966

PRENTICE-HALL
Englewood Cliffs,
New Jersey

Gentlemen:

Please send us an examination copy of "Computer Software: Programming Systems for Digital Computers."

Thank you.

Sincerely yours,

David J. Rogers
Professor of Botany

DJR:ch

MEMORANDUM

December 15, 1966

To Whom it May Concern

From: David J. Rogers, Taximetrics Laboratory, Botany Department

Subject: Explanation for Submission of Attached Documents

The enclosed resubmission for travel requests are being forwarded to more clearly represent the expenditures of funds for a trip to northwestern Mexico July 1 through July 18, 1966.

The explanation for the delay in this submission is that the Botany Department administrator, Mr. Brown, was caught up in a very difficult situation on his arrival on August 1, and the more pressing problems of the financial matters of the department had to take precedence over this matter.

The reason for this submission for out-of-state travel requests for Mr. Brill and Mr. Estabrook is again to more accurately reflect the expenditures. Any further questions will be gladly answered.

Congenital carr.

- Taximetrics Laboratory

December 14, 1966

Mr. David L. Largent
Botany Department
University of Washington
Seattle, Washington 98105

Dear David:

Please find enclosed a reprint from each of Science 132(3434) and Systematic Zoology 15(1): 59-69. We have not received from the publishers reprints of the other publications yet. Let me suggest that the Science article is of little more than historical interest as the techniques described therein have been replaced by those described in the more recent Systematic Zoology publication, to which the current BioScience artical may be considered a sequel.

You have expressed some desire to use our techniques on a classification problem in the genus Rhodophyllus. We would strongly encourage you to work with us in applying our techniques to your problem. There are many reasons for this. Among them:

1. The field of computer applications in taxonomy is young and experimental. The methods are not "cut and dried" and in fairness to your efforts and our methods we would like to work with you to ensure that you develop an understanding of what the method is, what you as a biologist must do to prepare data, and how the results of a computer analysis can be used by you to help solve your classification problems.

2. We are set up here with all the programs and computing machinery necessary for the analysis, as well as the personnel trained to operate the machinery properly. In general, it has proven unexpected trouble to run rather sophisticated programs such as the ones you mention on different machines and by operators who don't have a thorough understanding of what technically is to be done. If you are to prepare your data properly, it will be a fair amount of effort and expense on your part and this effort should be protected by having the analysis run properly. We suggest that it will be faster, cheaper, and more reliable to run your data with us here at Colorado State University.

3. We ourselves would hope to gain farther insight to the structure of biological data and the nature of classification problems through a cooperation with outside workers.

If you do choose to cooperate with us in this, we would expect a contribution in difference of operating expenses and machine time. If you are not really interested in cooperation, or did not realize the time and effort involved, we would be willing to send you program listings and wish you luck.

Very truly yours,

George F. Estabrook

GFE:ch

Enc.

P.S. Please also find enclosed a reprint of BioScience 16(11).

Dr. A. file at home

- Taximetrics Laboratory

December 13, 1966

J. B. Lippincott Co.
East Washington Square
Philadelphia, Pa. 19105

Gentlemen:

May I please have permission to reproduce in a paperback popular book on economic plants the following table: the authors are Pratt and Youngkin, the book is entitled Pharmacognosy, and the table required is found on page 168 titled "Pharmaceutical Applications of Crude Drugs and their Products."

Thank you.

Sincerely yours,

David J. Rogers
Professor of Botany

DJR:ch

Dr. Rogers file at home

- Taxinetrics Laboratory

December 13, 1966

Dr. Heber Youngken, Jr.
Dean, College of Pharamacy
University of Rhode Island
Kingston, Rhode Island

Dear Heber:

I have just written to Lippincott asking for permission to reproduce the table "Pharmaceutical Applications of Crude Drugs and their Products", page 168 in the text published by you and Pratt. I find the information contained therein to be a very useful summary of types of drug plant applications. This fits very well in my chapter "Drugs and Medicines."

We have our application to NIH for the Cinchona taronomy in the mill. The fate of the application is still to be decided. The earliest I fear that I can get a reaction will be from the March council. As soon as I hear, I hope I may enlist your aid in attracting the appropriate staff needed to do the job.

With best wishes for a merry Christmas and a happy New Year,

Sincerely,

David J. Rogers
Professor of Botany

DJR:ch

Seminar file (Boulder)

- Taximetrics Laboratory

December 13, 1966

Dr. Paul Winston
Department of Biology
University of Colorado
Boulder, Colorado

Dear Dr. Winston:

Enclosed are two sketchy biographies for myself and Mr. George F. Estabrook. These you may use as you like or any part thereof for the seminar to be given January 13. I suggest as a title for the seminar "Towards a Biological Information Retrieval System." If this is not satisfactory, please do not hesitate to say so. We expect to divide the seminar into two parts (1) the biological methodologies and (2) the needed software for computer development. I will speak to the first part and introduce the topic. Mr. Estabrook will handle the second portion.

Any other required information will be gladly supplied.

Sincerely yours,

David J. Rogers
Professor of Botany

DJR:ch

Enc.

Biographical sketch for David J. Rogers

1. Native of Florida, BS, University of Florida (Botany) 1941. Graduate work at Washington University, St. Louis, under Edgar Anderson and Robert Woodson (taxonomy—monographic studies of Euphorbiaceae). Ph.D. received 1951.
2. Taught botany and general biology at Allegheny College, Meadville, Pa. from 1951-1957.
3. Curator of Economic Botany, and editor of ECONOMIC BOTANY, the New York Botanical Garden, 1957-1965.
4. Professor of Botany, CSU, 1965—date.
5. Interest in the systematics of cultivated plants, in particular, of Manihot esculenta (cassava, manioc, yuca, and tapioca), family Euphorbiaceae. Intricacies of the relationship amongst the cultivars, and the reticulate nature of the relationship of these plants, led to interest in new methodologies to untangle the relationships, and this led into use of computers as aids in classification.

The methodological studies became as absorbing as the actual classification, and we broadened our work to the development of an interdisciplinary group, (which includes taxonomists, mathematician and programmer) now devoted to general application of taxonomic methodologies.

Biographical sketch for George F. Estabrook

Native of New York, but really cosmopolitan. Received his training at Dartmouth College, where he graduated from the honors program with a double major—one in structural mathematics, one in plant physiology. Now continuing his advanced work in the math department of the University of Colorado.

Came to work with the present group while it was still in New York, and in this period has continued his interdisciplinary work of development of a variety of mathematical models for systematic biology.

- Taximetrics Laboratory

December 12, 1966

Public Relations Department
Weyerhaeuser Company
Tacoma, Washington

Gentlemen:

I would very much appreciate receiving a copy of the brochure entitled "From Weyerhaeuser tree farms to you." At the same time, I would like to ask your permission to adapt for publication the pie-shaped statistics given on the last page of the above-named pamphlet. This figure represents the differing uses of wood a decade ago and today.

Thank you.

Sincerely yours,

David J. Rogers
Professor of Botany

DJR:ch

collaborators file

- Taximetrics Laboratory

December 5, 1966

Dr. Jerry S. Kidd
Program Director for
Special Projects Program
Office of Science Information Service
National Science Foundation
Washington, D.C. 20550

Dear Jerry:

Enclosed with this letter is a statement from Dr. Paul Barkley, the economist from Colorado State University who we hope will work with us on the economic evaluation of our IR work. The statement is a preliminary one, with the general ideas that he thinks will be needed in the evaluation. But what he and I need to know is whether this statement contains ideas which agree with your thoughts along the lines of this type evaluation. What we would like to do is to give you a few days to read over the enclosed paper, and then call you (with both Barkley and me on the phone) to get the necessary reactions. Barkley particularly would like to ask a few questions in order that he can be more specific when the time comes for making the actual proposal.

Unless we hear that you will not be available, I propose that we call you on Thursday, December 15, at 11 a.m. (your time).

The proposal is moving along. We can put the finishing touches on it if the activities mentioned above meet with general approval. We have just completed a two-day conference with Dr. Sidney Galler, Dr. Don Squires, and two programmers from the Smithsonian. They came to Fort Collins to discover what methodologies we propose for an IR system, and after having heard our proposals, decided to make a full-scale cooperative effort with us in the development. It is pleasing indeed to have the active participation of such a group, for the IR problems at the Smithsonian are of such an enormity that, if we can produce a system to handle some or all their problems, we will have gone a long way towards solution of most IR needs. During their visit, we discussed ways and means of collaboration, and the results of our discussion will be indicated in the formal proposal. It was clearly

indicated that our activities complement theirs in such a way that we will both be well-served by such collaboration.

We will be in touch on Thursday, December 15.

Sincerely,

David J. Rogers
Professor of Botany

DJR:ch

Enc.

- Taximetrics Laboratory

December 9, 1966

Mr. D. D. Trenchard
Departmental Secretary
Botany Department
University of Southampton
Southampton, England

Dear Sir:

We would like very much to remain on your mailing list for future reprints from your department. Please note our new mailing address.

Sincerely yours,

Henry S. Fleming
Associate Professor of Botany

HSF:ch

Manihot correspond.

- Taximetrics Laboratory

December 5, 1966

Dr. Walter H. Lewis
Director of the Herbarium
Missouri Botanical Garden
2315 Tower Grove Avenue
St. Louis, Missouri 63110

Dear Dr. Lewis:

Thank you for your prompt and pleasing reply to my letter to Dr. Gates on the proposed monograph of Mahihot esculenta. I am pleased to know that you are interested in this type of publication. I am also aware that you cannot buy a "pig in a poke", and that you will have to see the paper before any final acceptance. As a matter of fact, I think that I will need a considerable amount of editorial advice concerning the method of presentation and the inclusion of certain descriptive methods. For example, though this be called a monograph, I do not intend to establish a set of formal names for the clusters of cultivars. Rather, I would like to give the clusters an informal name which will be a descriptive, morphological epithet, for example, the "obovate lobed, rough-rooted group", the "linear lobed, smooth-rooted group", etc. Other than this type of difference, I expect to follow something of a "standardized monographic formula."

One question in my mind concerns the distribution of the Annals. Since I hope that this monograph will be widely circulated, not only amongst the taxonomic institutions of the world (to which I am sure the Annals are distributed), I would also like to get the paper in the front of as many tropical agricultural types as I can. My question, therefore, is how extensive is the distribution of the Annals to these types? Assuming the normal distribution of the Annals not to include many agricultural people, we can overcome this problem to some extent by distributing reprints. This is not as satisfactory solution as I would like because the inclusion of the paper in the regular distribution patterns is much the most satisfactory.

Distribution, while a matter of concern, is not uppermost in my mind, and no immediate solution is required.

I have fully intended on several occasions to stop by my Alma Mater to see what interesting things you people are doing. My latest effort to come (for the Annual Systematics) was shot down by a blizzard

Symposium

in Denver, but I will keep trying because I have some other ideas about machine handling of taxonomic data which I should like to talk over with you and Dr. Gates. So I shall attempt to be there and I will give you fair warning.

Best wishes for the Holiday Season,

Sincerely yours,

David J. Rogers
Professor of Botany

DJR:ch