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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.

Taxlmetrics Laboratory
Department of Biology
Armory 104
University of Colorado
Boulder, Colorado 80302
29 January 1968

C. J. Jardine
Whipple Science Museum
Free School Lane
CambridgeyUniversity
Cambridge, England

Dear Sir:

My colleague G. F. Estabrook has recommended to me your paper "The Structure and Construction of Taxonomic Hierarchies" which appeared in Mathematical Biosciences for June 1967.

I would be most grateful if you could send me two reprints of that paper if still available. Your work is highly regarded here.

Yours sincerely,

Howard Christensen

HC:gm

29 January 1968

W. M. Johnson
Rocky Mountain Experiment Station
240 West Prospect
Fort Collins, Colorado 80521

Dear Dr. Johnson:

It was a pleasure meeting you recently. Please find enclosed a few reprints which I hope you will find instructive.

Encourage Frank and Meredith to send a programmer to Boulder soon to learn how to implement the "Skyline" feature on the Fort Collins machine.

I look forward to seeing you again soon and to discussing in more depth your very interesting problem with CAREX and the relation which our techniques might have to it.

Very truly yours,

George F. Estabrook

GFE:gm

MEMO TO: Dean Lawson Crowe

SUBJECT: Admission of Bruce Handley to Special Student category.

DATE: 19 January 1968

Dear Lawson:

Bruce Handley, a member of my staff would like to be reconsidered for entrance to the graduate school in the category of special student. His undergraduate average is less than the minimum 2.75, but I can attest to Handley's capacity for graduate work. He has proven his ability during his work for me, and I unhesitatingly recommend his acceptance and that the 2.75 rule be waived.

Mr. Handley is desirous of taking a seminar under Dr. John Emlen. Both Emlen and I feel confident of the capacity to do a good job. The basis of this is that Mr. Handley has already been working with Dr. Emlen on some interesting and non-trivial mathematical models for ecology.

I will be pleased if you can reconsider and accept Mr. Handley in the category mentioned..

Sincerely,

David J. Rogers
Professor of Biology

DJR:gm

18 January 1968

Dr. Theodore W. Hurst
Worthington, Hurst and Associates
333 N. Michigan Avenue
Chicago, Ill. 60601

Dear Ted:

I am just getting around to responding to yours of the 14th which I am pleased to have. I met yesterday with two quantitative psychologists and they were enthusiastic about the potential for support for a graduate student through your efforts. There are several possibilities for working out things and I think that any one of them would be useful. We could have a student registered in psychology taking his curriculum under the direction of a psychologist doing his research work on a project of mutual interest to you and to us. I think that would be probably the best way to run it. Or, we could have one whose thesis problem pertained to your interests and have him under the direction of the quantitative psychologist. I would choose the former route, but we have to wait on good students which we do not have on the horizon at the moment. If you have someone to recommend as a graduate student we would be glad to have him.

We could work out the cost arrangements relatively easily. The usual arrangement for students on a research grant is at the rate of $2500 for nine months and $500 expense account. This is half time work and would therefore require four years for the Ph.D. or 12 grand for four years. We actually have to put up some scratch for summer time work (two months full time) which amounts to about $1600 for the summer. Thus an extra $6400 for a full four years or a total of $18,000. We could do this year by year because students sometimes come in for a year and then change their direction. If done year by year we are not stuck with the commitment. I hope this sort of information is what you are looking for. I think the idea of a graduate student working on these problems has a potential for pay off.

Thanks for writing.

Sincerely,

David J. Rogers
Professor of Biology

DJR:fm

18 January 1968

Dr. David M. Prescott
Editor, BioScience
PSR Building I
Campus

Dear Dave:

Goodall's paper is in good shape. I recommend that it be published essentially without change. However I hope he can do something to improve the illustration. The printout which he photographed is much too small to be legible.

Sincerely,

David J. Rogers
Professor of Biology

DJR:gm

Taximetrics Laboratory
Department of Biology
Armory 101A
University of Colorado
Boulder, Colorado 80302
16 January 1968

Dr. Luis Eduardo Patino
Centro Nacional de Investigacion
Agropecuarias
Apartado Aereo 233
Palmira, VAlle
Columbia

Dear Dr. Batino:

I am sedding under separate cover a set of reprints concerning the genus Manihot, with my compliments. It was a pleasure to have seen your Experiment Station recently and the excellent Manihot work that is being done there.

I trust that we will have an opportunity to visit at more length sometime in the future.

Sincerely,

David J. Rogers
Professor of Biology

DJR:gm

16 January 1968

Dr. Russell Seibert, Director
Longwood Garden
Kennett Square, Penna. 19348

Dear Russ:

I am writing for suggestions and advice about a problem which is becoming more and more pressing as time goes on. You are probably aware that I continue my interest in the use of various pieces of computing equipment for taxonomy both from the data processing angle as well as methods for aiding research workers. I now have a group of eight workers including myself investigating techniques for best application along various lines. I think we probably have the most balanced team to attack various complex problems such as information retrieval systems for museums and botanical gardens. We have recently received a $300,000 grant to put together a generalized complete computerized system for information retrieval.

At a recent meeting in Mexico City concerned with data processing systems which could be used to aid botanists (and horticulturalists) in keeping up with their data banks, we discovered that there is a tremendous amount of duplication of effort by biologists who have discovered the need for machines. I was struck with the inefficiency of most of these efforts because not enough money or knowledge is available to any one group to really do a thorough job of putting the machine to work.

Since we have done a considerable amount of work on this line, I feel we have something to offer biologists in need of programs, and wonder if it would not be useful to have a person familiar with the field and the techniques developed in it as a roving adviser who could put his hand in various techniques around the country which have been constructed and which could be used by a particular group or botanic garden or museum. This person would be able to suggest procedures in existence, give short demonstrations of certain techniques and tell biologists ways they could get the use of the most efficient machines to handle their problems.

It seems to me that such an individual could save a tremendous amount of labor and act as sort of an ambassador to the biological field from the computer field. I know that we have lots to tell people from our own experience and a knowledge of useful programs already available. It was evident at the meeting in Mexico that many people do not know of our programs although they have been published in the usual manner.

I would like your advice and ideas on the usefulness of such an individual not only to you at Longwood, but to the many other gardens in the country where hugh files of information are crying for computerization. I would be glad to talk further about this in case I have struck a responsive chord.

Sincerely yours,

David J. Rogers
Professor of Biology

DJR:gm

16 January 1968

Dean William Briggs
Hellems 102
C. U. Campus

Dear Dean Briggs:

I am sending herewith the abstract of a thesis submitted to the Mathematics Department for an M.A. The purpose of sending this is to acquaint you with the nature of this work, and to tell you my opinion about it.

The significance of this paper is not immediately apparent to people not involved in present-day biological systematics and evolutionary studies. I do not think its significance is fully appreciated in the math department. Mathematical models for evolutionary and systematic biology have only recently become possible. In these areas George Estabrook has already demonstrated tremendous insight and has produced useful models which will have an effect far beyond the fields of evolutionary and systematic work.

This particular paper presents the solution to a problem which is being attacked in several laboratories here and abroad. It deals with the discovery of the most "parsimonious" of a large number of pathways by which a group of organisms could evolve. Perhaps the three most active groups exist in the Department of Theoretical Biology, University of Chicago; in the Department of Biological Science, University of Michigan; and in the Department of Entomology, University of Kansas. George Estabrook's clear and precise mathematical formulation of this problem and its solution represents a fundamental contribution in an exciting area. The University of Colorado can be proud to have this serve as a master's thesis. I am sure that the thesis can be made available to you for further perusal in the event you have an interest in doing so.

Sincerely,

David J. Rogers
Professor of Biology

DJR:gm

16 January 1968

C. J. Jardine, N. Jardine, R. Gibson
Whipple Science Museum
Free School Lane
University of Cambridge
Cambridge, England

Gentlemen:

Please excuse my delay in responding to your very interesting communication. I have read your publication, "The Structure and Construction .... ", Mathematical Biosciences, I (1967) with great interest. I am not sure that the power of your arguments will be universally appreciated within the biological community for some time yet, although I find in this kind of mathematical eloquence much promise for the future of mathematics in biology.

I had the pleasure recently of speaking with Dr. Gordon Sheals of the British Museum. Dr. Sheals is familiar with your work (up to a point) and spoke highly of it. If you have not already done so, you should send a reprint of the above paper to Dr. Robert Sokal, Dept. of Entomology, University of Kansas, Lawrence, Kansas 66044, for inclusion in "Principles of Numerical Taxonomy" which he and Dr. Sneath are presently revising. I'm sure they would be most interested in your contribution.

With respect to your continuing work, I can make no constructive suggestion at present. I am, however, most interested in your efforts and I hope the quality of your recent results is a precedent for your future achievements.

My own area of interest has shifted somewhat in the past few months during which time I have been working on problems in numerical cladistics. Quite recently I have derived some interesting theoretical results which allow the direct computation of all branching sequences meeting the conditions of Camin-Sokol, Evolution, Vol. XIX, #17 (1965). As the result is but a few days old I do not have a manuscript prepared as yet. I expect to submit to J. of Theoretical Biology.

I have also become interested in problems in information retrieval for Biology. There is a remote possibility that wi will attend the tentative meeting for Information Retrieval in Edinburgh this coming August. If so, perhaps I will have the pleasure of meeting some of you in person then.

If any of you be interested in continuing this exchange, I shall try to be a better corrasnondeat.

Very truly yours,

George F. Estabrook
Research Mathematician III

GFE:gm

16 January 1968

Dr. Dorothy Parker
Rockefeller Foundation
111 West 50th Street
New York, N. Y. 10020

Dear Dr. Parker:

Dr. Rodenhiser advised that we should send requests for bibliographic services for Miss Frances Tersillo through your good offices. May I please request therefore that you ask Miss Tersillo to make for me a set of bibliographies on the appended topics.

For the study of the economic aspects of Manihot esculenta (cassava) I have a very good set of the scientific papers, but I do not have much in the way of books and journals describing the market value of the crop. About my only recourse has been through an old issue of the FAO Yearbook, and I would like to supplement this before writing my report.

Sincerely,

David J. Rogers
Professor of Biology

DJR:gm

BIBLIOGRAPHIC REQUEST

Specifically I am in need of the latest world production figures by major geographical units; for example. Latin America, tropical Africa, India and IndoMalaysia. I have no figures whatsoever to indicate the exports from any of these areas to the United States or to Europe. I would like to have a breakdown of the exports as to the nature of the exported substance; for example, I know that the dried chips of cassava are exported from the eastern tropics to western Europe for cattle feed - what quantities and what economic values in dollars and pounds does this amount to?

One of the products, tapioca, enters the market in Europe and the United States but I am not certain how much. I also know that the fresh roots are now imported into the United States for the Puerto Rican population and probably for the recent Cuban immigrants. It would be nice to have some idea how much fresh root is imported.

One of the great difficulties we have with reporting the significance of this crop economically is the variable nature of the reporting schemes - that is, all the figures, so far, seem lumped together of the various products mentioned and we have no notion from the statistics of the value of these products, not only abroad but in the producing areas.

If any report along the line of these problems can be uncovered I should be pleased to have it.

15 January 1968

Mr. Paul B. Holden
Utah Cooperative Fishery Unit
Utah State University
Logan, Utah 84321

Dear Paul: We have a run of graph clustering for you. Whether we send it to you or youccome pick it up depends on your decision and that will depend on the next few paragraphs.

But before I get into details about these suggestions, we cannot, without considerable effort, follow your suggestion to run a nodal distance array of the closest 20 objects. We would have to diddle around with the program and we do not care to break into the instructions and rewrite it.

Now comes the paragraph on the decision you make whether you pick up the graph clustering here or we send it there. In the last paragraph of your letter you asked about the character analysis program. To date we have not written up a set of instructions "How to Read the Printout" as we did for the graph clustering. There are several reasons for not having done so, but the most critical is that the complexity of the thing prevented us from writing less than a chapter of a book to explain it. "Charanal" is a very useful thing for you to have and I would suggest that if it is at all possible you come down here for a day or two to get instruction on its use. We think you would find it useful. If you can find time and money to do so, then I would suggest that you leave the printout of graph clustering here and pick it up at the same timeyyou get a run of Charanal. If you cannot make it, then we will send off the graph clustering to you very soon. I would not think it feasible to give you a run on Charanal without the necessary explanation.

Let me know what you want to do.

Sincerely,

David J. Rogers
Professor of Biology

DJR:gm

Sent 28 Dec
air parcel post

1 Pkg of Kodachromes
marked for "Rody"
to go to Dr. Rodenhiser -

Taximetrics Laboratory
Department of Biology
Armory 101A
University of Colorado
Boulder, Colorado 80302
11 January 1968

Dr. H. A. Rodenhiser
Apartado Aereo 58-13
Bogota, Colombia

Dear Rody

I am embarrassed about this but I am being pressed to pay the airfare for the trip to Colombia. On 12 December I sent Dr. Grant a summary of my expenses with my receipts. That letter may have gone astray. I would appreciate it if you would call it to his attention. (Below is a copy of the expenses)

I am in the process now of writing up the report and it should take only a week or so.to finish.

So far I have not heard from the lady in Washington who was supposed to be the librarian in charge of looking up information for various Rockefeller programs. Will you give me her name and address so I might call her?

My dental surgery went well on the 28th of December and I am now the possessor of a new set of temporary choppers; the permanent set to be installed probably within six months.

Best regards to you and your wife.

Sincerely,

David J. Rogers
Professor of Biology

DJR:gm

Expenses for trip to Bogota and return:

Car rental: Boulder-Denver	18.72
Plane,fare, round trip	492.30
Telephone, Miami-Boulder	5.00
Cablegram, Boulder to Bogota	3.75
9 1/2 days at $25 per diem	237.50
8 days consulting at $75/day	600.00
	$1378.77

10 January 1968

Mr. George S. Bass
Cra 7 #83-51
Bogota, Colombia

Dear George:

I have your various epistles in front of me including a Christmas card with a recipe for eggnog. (Would you please send me the necessary Huevos Oro to make this; also some rum?)

Seriously, the literature does not provide a decent answer to your question on storing chips. Shooting from the hip and using ideas from other stored carbohydrate sources,, I would think that if you could get to 8 - 15% moisture there is no reason why you could not store these chips in some suitable protected spot. May I suggest that you write to the Office of International Programs, Colorado State University, Fort Collins, Colo. 80521, and request that they put you in touch with the engineers who have been working on a similar problem in the state of Bahia, Brazil. These people may have had some recent experience in this connection. I know that they were making an effort to design appropriate equipment to make the chips and to dry them properly. Other than this, I am sorry no information is available to me.

Did you know that I had visited Colombia the first week in December? I was an adviser to the Rockefeller Foundation and made one or two feeble efforts to contact you then by telephone. However, you know about the telephone system there and its efficiency. Sorry I did not make it. I think you have a tremendous ally for the study of various problems on yuca through Dr. Gerry Grant whom you should certainly look up. His address is Apartado Nacional 32-79. There may be some phone number you can get him on. I understand you know Dr. Waugh who can put you in touch with Dr. Grant. At the moment some experimental work on yuca is being done at the experiment station in Palmira and you can probably contact the director of that station, Dr. Luis Eduardo Batino (Apartado Aereo 233). One of the Rockefeller staff, Dr. Jerry Maner (unfortunately now on leave in the States) has recently made some hog feeding trials there and is very excited about the use of yuca in this connection. I'll bet that if you try to push your own interests with both the Colombian people at Palmira and the Rockefeller people under Grant you will get some help locally.

I think you would be well advised to get in touch with a man now acting as consultant for the Rockefeller Foundation and in the same office as Dr. Grant: Dr. Rodenhiser. Dr. Rodenhiser is doing his best to help with the establishment of a tropical research station sponsored by Rockefeller and would be interested, I am sure, to help your own interest in yuca. He is a very pleasant guy and a solid scientific citizen.

Sorry not to be able to give you any more information, but there you are. Perhaps I will be coming your way again if Rockefeller decides to take up an intensive study of yuca in this new tropical research center.

Happy New Year.

Sincerely,

David J. Rogers
Professor of Biology

DJR:gm

10 January 1968

Dr. Mario Gutierrez G.
CIMMYT
Londres 40, 3er Piso
Mexico 6, D. F.

Dear Mario,

It was indeed a pleasure to see you again in Mexico. I have recently written a letter to Arturo Gomez-Pompa recommending strongly that he send us Sergio Ahumada from the computing center of the University. The purpose of sending him, of course, is to familiarize him with our techniques so that he can be of service to you and Gomez-Pompa. I have agreed to pay the bill for his travel.

In the meantime I have sent reprints to you and Dr. Gil. I would suggest very strongly that you pay particular attention to one by Rogers and Estabrook, entitled "A General Method of Taxonomic Description for a Computed Similarity Measure." While that paper pays attention to the structure of data for a classification program, very similar attitudes can be adopted for structuring data about your germ plasm bank to be used in an information retrieval program. It would be very helpful if you could let me have a sample of the data which you wish to put into an I/R system. With this we could advise you on the proper construction of these data. Then with Ahumado's assistance you could go ahead and develop the system necessary for your own operation. We will be very pleased to work with you and giveyyou the benefit of our thinking along these lines. I look forward to cooperation with you and hope we can be of service to you inthis type of endeavor.

Sincerely,

David J. Rogers
Professor of Biology

DJR:gm

1554 Moorhead Ave.
Boulder, Colo. 80302
10 January 1968

The Honorable Senator Gordon Allott(& Dominick)
Senate Office Building
Washington, D. C.

Dear Mr. Allott:

It is not understood by me why you have not supported the gun restriction law which has failed to receive sufficient support. No matter how one may argue that guns do not kill people the fact that idiots can purchase weapons without any restrictions is not a question of freedom but of stupidity. I strongly recommend that you support extremely restrictive laws on the sale of firearms in this country.

Sincerely yours,

David J. Rogers

DJR:gm

1554 Moorhead Avenue
Boulder, Colorado 80302
10 January 1967

The Honorable Postmaster General
Post Office Department
Washington, D. C. 20260

My dear Mr. O'Brien:

I resent the recent raise in rates without a comparable raise for junk mail. I see no reason for supporting a raise in first class mail without a much larger raise for businesses so so that unwanted junk will be sent at their expense.

Sincerely yours,

David J. Rogers

DJR:gm
Copy to: The Honorable Donald Brotzman

over

A

9 January 1968

Membership Chairman
Association for Computing Machinery
211 East 43rd Street
New York, New York 10017

Dear Sir:

On October 3 I sent you a letter requesting membership for Mr. Robert Brill, a member of my staff, whose address is that of the letterhead.

Because of the accounting procedures of the University it would be preferable to present an invoice for payment rather than to try to obtain a check in advance.

Will you please let us know if it will be possible to obtain this membership for Mr. Brill?

Sincerely,

David J. Rogers
Professor of Biology

DJR:gm

9 January 1968

Dr. Donald Squires
Natural History Museum
Smithsonian Institution
Washington, D. C. 20560

Dear Don:

This letter sort of backs up the one from Bob Brill. We are indeed excited to hear that the data concerning the types of your botanical collection are being actively looked to for their information retrieval aspects. As Bob suggested we would be very pleased if a copy of the data bank could be made available to us as the tapes are produced. We would very much like to tryo out our new IR system with your data bank on the types.

We will be happy to hear if it is feasible to let us have copies of whatever tapes or other input you have designed for this work. If there is any work necessary on our part let me know and one of us will get there to do it. Ittwas good to see you in Mexico.

Sincerely,

David J. Rogers
Professor of Biology

DJR:gm
Copy: Stanwyn Stetler

P.S. Have you heard about an IR meeting sponsored by "IFIP" in Edinburgh next August? If so, tell me ~~about~~ if it is worth going to see or to participate.

9 Jan 68

Dr. Warren H. Wagner
Department of Botany
University of Michigan
Ann Arbor, Mich. 48103

Dear Herb:

Following our conversation of last fall I would like to invite you to come to Boulder for consultation, seminar and advice. We will take care of your travel expense and Askell Löve has invited you to stay at his house. Please give us a time which is available to you. We usually have our seminars on Friday afternoon and have a dinner afterward for those interested in coming along. I would therefore suggest that if you could make it, come on Wednesday and stay through Friday.

We would like advice for the development of a new botanic garden, plans for which are in the making at the moment. We would also like to have a full day with you at least going over some of our more theoretical studies of systematics and evolution. The seminar can be anything you might choose: Ferns and Evolution, as you suggested, or the Groundplan of Evolutionary Studies, or you might care to think about the Place of a Botanic Garden in a University. I would personally like to hear about all of them, but in keeping with the idea that you are coming here under the aegis of funds purportedly for advising on the garden I would tend to weight the one on the botanic garden. However, you choose your own weapons.

I hope you can give us a day for your visit in the near future.

Sincerely,

David J. Rogers
Professor of Biology

DJR:gm

Aerogramme

Taximetrics Laboratory
Department of Biology
Armory 101A
University of Colorado
Boulder, Colorado 80302
9 January 1968

Dr. John Cutbill
Department of Geology
Sedgwick Museum
Downing Street
Cambridge, England

Dear John,

It was a pleasure to see you at the Mexico meeting. Let me reinforce our invitation for you to come to see us in April. I have just put "the whip" to the boys telling them that they must have have a completed information retrieval system for your examination at that time.

Have you heard of a meeting in Edinburgh next August of some organization whose initials are "IFIP" (International Federation for Information Processing)??? Should we attend, if you know about it? Tell me anything you know about this group. It's news to me.

Sincerely,

David J. Rogers
Professor of Biology

DJR:gm

8 January 1968

Miss Ann Ferren
BioSciences Information Service
2100 Arch Street
Philadelphia, Penna. 19103

Dear Ann:

I am just getting caught up with long overdue correspondence. I was glad to have the information about Bob, although I am terribly, sorry about his wife. This was news to me. He may have told you that we are trying to see if there is some way for him to come along, although the prospects are very "iffy."

You asked in your letter if Dr. Pennak was the one who asked the questions at the seminar. No, it was not. He seldom opens his mouth at such meetings. The fellow who asked all the silly questions was a chap by the name of Shushan,

We do hope you will come this way again. It was a pleasure to have you. Give our best regards to one and all at BioScience.

Sincerely,

David J. Rogers
Professor of Biology

DJR:gm

8 January 1968

Dr. Arturo Gomez-Pompa
Instituto de Biologia
Universidad Nacional Autonomico de Mexico
Mexidd 20, D. F.

Dear Arturo:

First let me congratulate you on a really fine meeting. We were all very pleased by the arrangements for hospitality and the general scientific level of the proceedings. I hope this is the first of many such fine gatherings.

I do hope that you will be able to find time for Sergio Ahumada to come here to see us. I was serious about paying for his travel funds; I think we can afford it. I would recommend, if travel arrangements can be made, that he spend a week with us and I think it would be better if he could come sometime in the months of April or May. I will be glad to have him stay with me and thereby reduce his living costs. It is my firm conviction that we can contribute considerably to your efforts for your information retrieval system and I hope that you will take advantage of our offer.

Once again let me thank you for your great efforts on our behalf at the symposium.

Very sincerely yours,

David J. Rogers

DJR:gm

5 January 1968

Dr. John R. Reeder, Editor-in-Chief
BRITTONIA
Department of Biology
Yale University
New Haven, Connecticut 06520

Bear John:

Finally, here with, the two papers you sent me so long ago. I could claim all sorts of excuses for not returning them sooner, but you've heard 'em all.

I do agonize over these reviews. I get several of my crew to read them and we have discussions about the merit, correctness, value, etc. One of our troubles is that we've been doing these things long enough to know, at least, that most of the problems exist, and have developed some background which many of the people first getting on to the use of computers seem to discover in these papers. All this is in way of saying that it is difficult not to merely wave a hand and say that, from our Olympian seat, your paper isn't worth doing. But this won't help a bit.

I do wish that some of our colleagues would be a little more sophisticated about this work, and if they don't know how to answer some particular statistical or mathematical problem themselves, they would take the necessary steps to communicate with a sympathetic mathematician. For in this work there are at least three separate disciplines to master if the machinery is ever to be useful, and many of these papers are really the results of no mastery of any of the three.

First of all, the authors of the Cucurbit paper apparently think that the various methods now employed for numerical taxonomy were specifically designed for numerical taxonomy, add unfortunately, this simply is not the case. The authors have not thought out what each of the various statistical methodologies were intended for in the first place, and whether or not they can be forced to apply to their own work. The are not alone - many others "accept" some statistical procedure or other without knowing its function. This is a rather difficult task, I admit, and one that I learned only after some rather hard-won experience, but learn it I did, and they should too. Really nothing is contributed by taking methodologies and sort of "shooting crap" with them. Maybe, the attitude seems to be, if we take enough of these things, we can build a bridge with them. If the results look "close to" our feelings, then they must be "right. But for such work, this is costly, time-consuming, and not scientific.

Secondly, the paper by the Bobisuds (on computer key construction). It has some problems, as you'll see intthe enclosed comment sheets, but there is an even greater one that we think should be considered - in the long range of things. First of all, most of the work here for keys intends to use the computer as a sort of substitute for the human, or to put it another way, to make the computer do a key the same way a human does - that is, a sequential processing of the key elements. This is terribly wasteful of t the computer's time, and of the human who must attend the hardware while this type of key is running. Computers can do identifications in a different manner than we can, and more efficiently, so we should be addressing the development of computer based identification systems to the simultaneous consideration of characters, rather than a sequential consideration. This idea is not new with us, but is in the thinking of several people, Sokal among them. We will have a paper out on the subject fairly soon, but in such a sophisticated way that it will have to be put into the Journal of the Association of Computing Machines. It will be spelled out for biologists, probably in Creator.

I hope that I have said some meaningful words hereffor you. I want to encourage people to work with computers, and I certainly want to help you get them into Brittonia, if at all possible. But I did want to get some general statements to you, not specifically to the authors of these papers.

Sincerely,

David J. Rogers
Professor of Biology

DJR:gm
Enc.

4 January 1968

Dr. Donald Squires, Deputy Director
Museum of Natural History
Smithsonian Institution
Washington, D. C. 20560

Dear Don,

When during the final discussion at the Mexico City symposium the topic was raised of the Smithsonian's type collection of plants, it occurred to me (and I immediately mentioned it to you) that the curatorial information covering this collection would make an excellent data bank for the TAXIR system. Several considerations struck me at once as pertinent.

1) Earlier we had discussed Ortner's "morgue" as a candidate data bank for our system. I mentioned that with our compressed characteristic function technique these data would very likely fit entirely in core storage. You rightly pointed out that while the resultant retrieval speed would be impressive, a larger data bank that would force us out onto tape or disk would be a more valid test of our system. The 60,000 specimens in the type collection (as compared to Ortner's 8,000 specimens) are of this more desirable magnitude.

2) Judging by the responses of Drs. Thomas and Gomez Pompa it seems likely that the size of the collection will increase from contributions by other museums and that other type collections, although not added physically to the Smithsonian collection, would be added to the same IR system, so that workers could ultimately interrogate a single system for finding types wherever they may be located. All of this would be on top of the normal sporadic contributions made by collectors of new species. The collection then is, and when automated will be even more so, in a state of expansion. This property of the collection should enable us to test the ability of our system to update the search files. While not underrating the importance of the Ortner material or the frequency with which it may be consulted, is it not true that it is quite static?

3) As I think I may have told you, the XPOP software we plan to use is not ready for our machine as we had expected. We are going ahead with a preliminary working version of the system coded in FORTRAN. While this first version will not have the design flexibility that XPOP will later provide, it will incorporate our compressed characteristic function technique, will retrieve efficiently, and what is more to the point, will be ready for use sooner than our original plans anticipated. Our target date for an operating

system is June of this year. We must check the details with Nick Suszynski but I believe that after checkout on the CDC 6400 in Boulder we could install the system fairly easily on the CDC 6400 at Cambridge, Mass., to which you have a tie-line, thus putting control of the data bank in your shop. I have no idea how Stan Shetler feels about this, perhaps he has already formulated other plans for the type collection, but it is perhaps well to consider that the TAXIR system probably represents the fastest method of automating this important collection.

One technical problem does exist. We hill have to gain access to equipment which can convert the data from your SCM paper tapes to IBM punch cards and then we will have to write program to make the data conform to our input format. How serious this data conversion will be can only de determined by talking

system is June of this year. We must check the details with Nick Suszynski but I believe that after checkout on the CDC 6400 in Boulder we could install the system fairly easily on the CDC 6400 at Cambridge, Mass., to which you have a tie-line, thus putting control of the data bank in your shop. I have no idea how Stan Shetler feels about this, perhaps he has already formulated other plans for the type collection, but it is perhaps well to consider that the TAXIR system probably represents the fastest method of automating this important collection.

One technical problem does exist. We will have to gain access to equipment which can convert the data from your SCM paper tapes to IBM punch cards and then we will have to write a program to make the data conform to our input format. How serious this data conversion will be can only be determined by members of our group talking to Shetler and Suszynski.

If the above notions gain acceptance with you and your staff, please let us know and we'll make arrangements with you to set up collaboration. Incidentally I felt that the Mexico City symposium was quite productive. Despite some wide differences in viewpoint and a serious problem of communication, I think the conference will prove to be of great importance for the future of taxonomy.

Sincerely,

Robert C. Brill

RCB:gp
CC: Nicholas Suszynski
STANWYN SHETLER

4 January 1968

Dr. Marshall C. Johnston
Herbarium - B.L. 222
The University of Texas
Austin, Texas 78712

Dear Dr. Johnson:

Enclosed is my write-up for Manihot. I am terribly sorry for having taken so long and feel bad that you had to jog my memory over such a small task.

You will notice that I have decided not to reduce the species to a subspecific status as originally noted. I will maintain it as the species because it is a more flexible taxon to deal with, and I think it valid for purposes of a flora. Let me know if there is other writing required.

Happy New Year.

Sincerely,

David J. Rogers
Professor of Biology

DJR:gm

Taximetrics Laboratory

Armory 101

2 January 1968

Sr. Rafael Girard
11 Avenida "A" 8-03, Zona 2
Guatemala, America Central

Dear Doctor Girard:

With respect to your card, I have the following answers:

1. My only idea that Manihot was found in southern Florida in the pre-Columbian epoch is from the ethnological studies of William C. Sturtevant, "Taino Agriculture", reprinted from Antropologica Supplement No. 2, The Evolution of Horticultural Systems In Native South America: Causes and Consequences - A Symposium, Caracas 1961. As to the date of the introduction I am not at all certain. Most of my conjectures concerning the distribution of the crop have as a background the fact that the first Spanish contacts were not agricultural but exploitive and that if movement of the crop was to be made, it would have been made by a more peaceful group of people, not the conquistadores. I look to the Indians as being the more peaceful.

2. Concerning the name cuacamote, I must refer you to the Bablanus manuscripts. As I understand the stem "camote" is nothing but a "root crop" and camote with prefixes used by the Indians designated the specific root crop. The European languages adopted the stem and through usage people have come to designate camote as Ipomoea batata.

3. Concerning Ipomoea batata I must be cautious in interpreting its origin on a similar basis as that of Manihot. It would surprise me if any group of Indians did not make many efforts to use many different types of roots. If you look under the ground there are very large numbers of roots of plants with storage organs on the roots. Thus, for example, certain varieties of Phaseolus vulgaris have an edible root. Therefore, Ipomoea batata could have been found or used or exploited either with, earlier than or later than Manihot and its application would be a chance finding.

4. From the work of Douglas Yen I think we can probably be certain that sweet potatoes (Ipomoea batata) are indeed American in origin.

Thank you for your Christmas card. I send to you my hopes for a prosperous and happy New Year.

Sincerely yours,

David J. Rogers
Professor of Biology

DJR:pm

2 January 1968

Dr. Anthony Ralston
State University of New York
Buffalo, New York 14214

Dear Dr. Ralston:

We have discovered some changes we would like to make in the manuscript for the Journal of the Association for Computing Machinery. Would you please forward the Errata Sheets to the reviewers who have copies of the manuscript?

Thank you very much.

Very truly yours,

George F. Estabrook

GFE:gm

2 January 1968

Dr. Franklin W. Martin
USDA, ARS, CRD
Federal Experiment Station
Mayaguez, Puerto Rico 00708

Dear Frank,

The enclosed inflorescence heads were collected from a pink flowered Ipomoea which I am ashamed to say I cannot name. It is probably the same weedy species we examined growing along ditch and railroad banks in Georgia last September. It is a very common weed in the fields just about sea level in the state of Vera Cruz. These plants were collected about eight miles south of the city of Vera Cruz on roadsides. I am not sure there are any viable seeds contained herein.

I have received Al's recent data for a preliminary run on the computer so that he can get some idea about the methodology we now have available. I hope the results will be shortly forthcoming..

What news have you? I hope to be here in Boulder without running around the world at least till next summer. Do you plan by any chance to be at the Caribbean meetings of the American Horticultural Society in Trinidad? We might plan on that as a meeting to get together for further discussion on our mutual project.

Best wishes for a Happy New Year.

Sincerely,

David J. Rogers
Professor of Biology

DJR:gm

2 January 1968

Dr. Julian A. Steyermark
Insrituto Botanico
Apartado 2156
Caracas, Venezuela

Dear Julain:

The Manihot specimen, 99,980, has arrived. It will be difficult to find a good "home" for this relatively interesting specimen. It has some mixture of qualities between three or four entities.(which is really normal for this crazy mixed-up genus). First of all has affinities with certain Guiana species but then it is a curious carrier of some floral characteristics which I attribute to material further to the west of you in the Santa Margaritas. I would certainly like to have more representations of it if it would be possible to have some.

You will note our change of address. We moved out to this place in July 1967. Several things dictated the move. Unfortunately our grant for the Cinchona study was not funded. The heavy hand of Fosberg was evident in the comments from the anonymous reviewer who turned it down for several reasons none of which I consider to be valid.

Sincerely,

David J. Rogers
Professor of Biology

DJR:gm

2 January 1968

Dr. David W. Goodall
Division of Biological Sciences
University of California
Irvine, California 92664

Dear David:

Thank you for sending the program for computer identification. I hope to be able to get to it, and understand it soon.

Best wishes for the New Year.

Sincerely,

David J. Rogers
Professor of Biology

DJR:gm

2 January 1968

Dr. Luis A. Montoya
IICA en Mexico
Londres, 40, 1er Piso
Mexico 6, D.F.

Dear Dr. Montoya:

This is the first opportunity I have had to sit down and tell you how much I appreciate your magnificant efforts to make our stay in Mexico successful. I am deeply indebted to you for your kindness and generosity, and I trust that sometime I shall be able to repay in part this debt we have to you and your wife. I shall be corresponding with you in the future but in the meantime be assured of our best wishes for a successful and happy New Year.

Very sincerely,

David J. Rogers
Professor of Biology

DJR:gm

29 February 1968

Dr. Richard A. Howard
The Arnold Arboretum of Harvard University
22 Divinity Avenue
Cambridge, Mass. 02138

Dear Dick,

I've just checked with Dr. Baynton and discovered that he plans to keep you plenty busy on the morning of the 11th, but that he has no specific plans for Tuesday morning, the 12th. Your seminar at 3:00 is followed by a social endeavor in the evening.

It is possible to get to Boston leaving about 2:38 P.M. from Denver, but this is not a direct flight - you have to change planes in Chicago (waiting about an hour) - and arrives in Boston at 9:30 P.M. The only direct flight on Wednesday is in the morning.

This leaves you the opportunity then of meeting on Tuesday or Wednesday morning. I would have suggested Sunday, but we have a visitor who will be leaving about 6:00 P.M., and I will be rather tired out from what I expect to be a strenuous visit and would not recommend Sunday night. We can get most of the description and views across in a morning session and I will keep open both Tuesday and Wednesday mornings, the 12th and 13th. I hope you can make it during that time.

Sincerely,

David J. Rogers
Professor of Biology

DJR:gm

28 February 1968

Dr. John O. Corliss, Chairman
Department of Biological Sciences
University of Illinois
Chicago Circle
Chicago, Illinois 60680

Dear Dr. Corliss:

This letter supports the candidacy of Dr. Theodore Crovello for a position in your department. I have known Dr. Crovello through correspondence and at scientific meetings over the past four or five years.

Ted has demonstrated to a very high degree all of the following attributes: an independence of thought, willingness to learn, ability to grasp complex concepts, ability to express himself both verbally and in writing, friendliness and humility.

At the University of California, because of his own interests, not because of the stimulus of his department, he became sufficiently well acquainted with both statistics and computing to be able to produce a very crediable work on the numerical taxonomy of certain species of Salix. He combined the best of "classical" systematic skills with the essentially "modern" techniques of computer programming in a way which was admirable. To my knowledge, none of the botanists on the staff at U.C. could give him direction in the necessary computer methodologies, rather he instructed several of the staff in the techniques which he had learned.

Since earning his degree, he has continued to work in areas most frequently designated as numerical taxonomy, broadening both that subject and himself. I have had frequent occasion to review his papers for publication, and have found him most amenable to suggestions which were just, and also very able to defend himself when there was disagreement. And the papers themselves usually are addressed to some pertinent issue.

Altogether, I think you will be very well advised to add Dr. Crovello to your staff. I am not in a position to judge his classroom ability, nor all traits of his personality. But what from what I have seen, he would come highly recommended.

Sincerely,

David J. Rogers

DJR:gm

Taximetrics Laboratory
Department of Biology
Armory 101A
University of Colorado
Boulder, Colorado 80302
28 February 1968

Dr. J.-C. Gardin
Centre National de la Recherche Scientifique
CENTRE D'ANALYSE DOCUMENTAIRE POUR L'ARCHEOLOGIE
31, chemin Joseph Aiguier
13 - MARSEILLE 9e, France

Dear Dr. Gardin:

I am pleased to have your invitation to participate in an International symposium on The Use of Computers in Archeology. A suggested title for my contribution would be "Theoretical and Practical Considerations on Data ~~Structuring~~ for a Computerized Information Retrieval System."

I should like to recommend that you issue an invitation to Mr. George Estabrook, mathematician on my staff. The reason I presume to make this suggestion is that Mr. Estabrook is one of the most productive mathematicians working in the areas which are suggested by your outline. His conceptualization and development of mathematical models for various aspects of problems in biology (which are, of course, very similar to those in archeology) has been of the greatest value. I would suggest that Mr. Estabrook could give an extremely useful contribution to this Symposium under (B): "Mathematical problems involved in the handling of symbolic systems." I trust that this suggestion is acceptable to you. Once again thank you for your invitation and I look forward to participating in this symposium.

Sincerely yours,

David J. Rogers
Professor of Biology

DJR:gm
CC: George Estabrook

26 February 1968

Dr. R. W. Richardson, Jr.
The Rockefeller Foundation
111 West 50th Street
New York, N. Y. 10020

Dear Ralph:

Here are copies of my letter to Dr. Wellhausen and the blurb that I wrote to describe our information retrieval system. I am not sure that the description is much more than an advertisement but I hope that it has the characteristics necessary to indicate the value of our methodology. I will be pleased to hear from either you or Dr. Wellhausen when you have had an opportunity to talk it over together.

You will note that we expect to give a demonstration of the system sometime this summer and would like to have you see the system in operation. This, I believe, will be more meaningful than any otherway to show the values of the system. We will give you more details of exact timing as we come closer to completion.

Thanks for your attention.

Sincerely,

David J. Rogers
Professor of Biology

DJR:gm

Taxlmetrics Laboratory

Armory 101

23 February 1968

Dr. Edwin J. Wellhausen
International Maize and Wheat Improvement Center
Rockefeller Foundation
Londres 40, Mex
Mexico, D. F.

Dear Dr. Wellhausen:

I enclose herewith a statement concerning the possible application of a computerized information retrieval system which I hope will be of interest to you. The reason I send it to you at this time is that I learned from Dr. Mario Gutïerrez just before Christmas that he was intested to learn whether or not some such system might be used for the maize germ plasm bank maintained at Chapingo. I told Dr. Gutierrez that we had developed a useful system, but we did not have an opportunity to discuss its details.

Earlier this week, I visited Dr. Richardson in New York and explained to him that we have a computerized information retrieval system whose disign is useful for maintenance and retreival of information about germ plasm. He suggested that I write to you, giving a brief description of the methods we have developed, in the hopes that you might be interested in adapting the methods to use with the collections of data on your germ plasm for wheat, maize, and other small grain coops.

We developed our system under a grant from the National Science Foundation, and it is, therefore, in the public domain. Our hope is that it can be put to use as an aid to your valuable collections, and to this end, we are willing to do more than just "turn it over to you". We recognize that any such system, if adopted, requires some aid and instruction in getting it to work for you. To this end, we will be glad to instruct staff members in the methodologies, and give short (one, two, or perhaps three weeks) instruction to your scientists in the ways of getting the most benefit from the system.

I hope that we can be of service to you, and that you will accept our invitation to drop by Boulder some time in the near future for a more detailed description of our methods. I might say in passing that we are acquainted with the problems of information storage and retrieval for the problems of germ plasm banks, having worked with Dr. Ed. James, Director of the Seed Storage Lab, USDA, in Fort Collins, Colorado. Because of our knowledge of the germ plasm collections there, we feel confident that the system we have designed is directly applicable to your collections.

Please let me know if you would like to have more information about this proposal.

Sincerely yours,

David J. Rogers

DJR:gm

We propose that a computerized information retrieval system be adapted for the germ plasm banks now maintained in Mexico under the direction of the Rockefeller Foundation. The purpose of the information system is to provide rapid access to any information or data about the collection, to allow for expansion of the data store in an orderly, economic fashion, to provide inventories of the collection and most important, to increase the usefulness of the stored germ plasm for plant breeders and other agricultural specialists.

The characteristics of the proposed system are as follows:

1. Easy conversion of existing data files. We have designed a procedure which is close to the normal procedures used to describe the data about each of the germ plasm collections. A person presently charged with the filing of the data can be trained to convert the data to computer-readable form in about 4 hours. No computer experience is necessary for this part.

2. Efficient storage procedures for the computer. Because of the The system is open-ended. amount of information about a germ plasm collection (and other data files) is already of considerable quantity, and will continue to grow, it was critical to develop a system using the computer which would not eventually be too cumbersome in the memory systems of the computer. Our system not only is efficient in terms of present needs but allows for even greater storage efficiency as more data are accumulated. Other characteristics which are important are the updating, correction and deletion of data features. In each of these our system provides automatic procedures, and no rewriting of the system will be required.

3. Complete flexibility of access to the incorporated data. We have developed a system which allows inquiries about the items included in the data bank. Specified listings of information may be requested. For example, "list all the 12-rowed maize varieties with a waxy endosperm from Peru;" names of varieties with certain attributes: "What varieties are available in the

germ plasm bank with qualities _____, _____, and _____. The program also allows inventory of the data, or complete listings of the incorporated data.

4. Speed of access. One of the most significant contributions that our computer based information retrieval system offers is the saving of time of searching the files for information. With data banks the approximate size of yours, it is reasonable to expect an answer back from an inquiry almost immediately. This is true because of the unique design of our system.

5. Compactness of permanent storage. The reduction in amount of shelf-space needed to keep all the records in permanent storage is considerable. We expect that the data bank could be kept on one reel of computer tape, which is probably a considerable saving over present files of stored data. ~~This form of permanent storage also has the advantage of not being error prone when~~ modifications, additions, deletions, etc., are made. The system is designed to inform the user of errors when Once a record has been placed on the tape, it is not subject to loss, as is the case with file card systems. ~~because each record has its own unique address~~.

6. System designed for the working biologist. This system is designed with the practical considerations of the working biologist in mind. Not only is it possible to retrieve the information from the system, but he can test new hypotheses by rewording and recombining queries about the data. For example, discovery of the most "typical" attribute, when a range of attributes is given. In addition,

7. Complete computer programs for the above, with advisors on both the agricultural and computer setups. We have set a target date of July 1, 1968 for completion of the programs. A demonstration of the techniques, with information very similar to that incorporated in the germ plasm files, will be given in Boulder in August or September of this year. Preliminary to this demonstration, however, we could begin to gather pertinent data into computer-ready form, and include a sample study or demonstration using the information

from your own collection. It is not anticipated that you will have personnel who are knowledgeable of our techniques, and we anticipate close cooperation with you to give the necessary instruction on the methodologies. More important, the working biologist can be given instructions in a short time which will enable him to use the system confidently. It is not necessary that he become a computer specialist to fully use the system.

With respect to computer requirements to mount such an information retrieval system for your germ plasm data, several possibilities exist. At the beginning, we suggest that the data be processed on computers available here in Boulder. While we recognize that you will eventually want to have the system mounted on computers available to you in Mexico, it seems reasonable to begin here in Boulder working on a machine readily available, and at a later date, mount the system on your hardware. While we could mount the system on your own equipment at first, the process would be more time-consuming and not particularly efficient. The reasons for this are several, but the over-riding reason for starting here is that the programs and staff are here. We could begin actual operations with your data very shortly, and then, while your personnel gain familiarity with the procedures and values of the system, carry out the process of preparing your data for mounting on your equipment. We can work out the actual details of procedures with you, if you find the idea appealing and useful to you.

26 February 1968

John Wiley and Sons, Inc.
440 Park Avenue, South
New York
New York 10016

Gentlemen:

We are teaching a course in "Taxlmetrics" and would like to obtain a copy of Richard E. Blackwelder's Taxonomy, a Text and Reference Book for use as a desk copy for the course.

Sincerely,

David J. Rogers
Professor of Biology

DJR:gm

26 February 1968

Dr. D. D. W. Goodall
Department of Population and Environmental Biology
University of California
Irvine, California 92664

Dear Dr. Goodall:

I enjoyed meeting and talking with you last November in Lawrence, Kansas. You may remember our discussions on information retrieval when I promised to send you a confidential preprint of a recent paper of ours. I received the list of participants for that conference this morning and was reminded of my outstanding obligation. Please find enclosed this paper. I would be pleased to hear any questions or comments you might wish to make.

Very truly yours,

George F. Estabrook

GFE:gm

26 February 1968

Dr. Grady Webster
Department of Botany
University of California
Davis, Calif. 95616

Dear Grady:

Thanks for the recent sending of your reprints. I am also writing to ask whether or not you have had any more thoughts about the uses of computers for your activities. I know you have made an inquiry about them earlier. We are still hoping that we can be of some use to you in this connection. We are on the verge of sending off a manuscript to the Annals of the Missouri Botanical Garden on the classification of Manihot esculenta, which was done with the aid of our computer programs. You might be interested in the techniques used and some of the results obtained. So come and see us and we will give you the full treatment.

Sincerely,

David J. Rogers

DJR:gm

26 February 1968

Miss Virginia Weadock
New York Botanical Garden
Bronx Park
Bronx, New York 10458

Dear Virginia,

Following my usual practice I lost the note which I brought back from the young lady which inquired about the summer program of the Artic and Alpine Institute, so my reply is somewhat general. I did check with the director (Jack Ives) and he said that no applicants would be chosen until sometime in either April or May, and nocchoises have yet been made. Therefore if the young Lady is still interested, there is still plenty of timeffor her to write directly to Dr. J. D. Ives, INSTAAR, Armory 118, University of Colorado, Boulder, Colorado 80302, and discover what she needs to know.

Sincerely,

David J. Rogers
Professor of Biology

DJR:gm

23 February 1968

Dr. Diego Jordano
Departamento de Zootecnia
Consejo Superior de Investigaciones Cientificas
Facultad de Veterinaria
Cordoba, Spain

Dear Dr. Jordano:

I am pleased at the interest you show in our methods. I am sending under separate cover (surface) the documents you request. These include

1. Fortran source list of Program Graph
2. Systems document for Program Graph
3. Reprint of "A General Method of Taxonomic Description for a Computed Similarity Measure," BioScience, Vol. 16, #11, 1966.
4. Reprint of AA Mathematical Model in Graph Theory for Biological Classification," J. Theo. Biol., Vol. 12, 1966.
5. Two user's documents.
   i. How to design the input (data) deck.
   ii. How to read the printout.

I hope the documents will prove sufficient. Please feel encouraged to communicate with me about any further questions or comments you may have.

Very truly yours,

George F. Estabrook

GFE:gm

23 February 1968

Dr. Nelson G. Hairston
Museum of Zoology
University of Michigan
Ann Arbor, Mich. 48104

Dear Dr. Hairston:

Bob Brill showed me your letter of the 19th. We will be pleased to have you spend at least two days with us and would recommend that you make it sometime in the late spring. Perhaps May would be a useful month to visit. By that time we should have had most of our information retrieval system built and would therefore be able to explain it in detail and be able to suggest how you would be able to use it.

We hope you can find time to visit us because we feel certain that we have something specific to contribute to solution of curatorial type problems.

Sincerely,

David B. Rogers
Professor of Biology

DJR:gm

23 February 1968

Dr. Luis A. Montoya
Official Representative IICA in Mexico
Londres 40, 1er Piso
Mexico 6, D. F.

Dear Luis,

Under separate cover I am sending the Nickerson color fan, which I promised earlier. I trust you will find it useful.

We are still reliving the memories of our very excellent trip with you to Vera Cruz and the extremely pleasant evening we spent with you and your wife in Mexico City. Please give your wife our best regards.

Sincerely,

David J. Rogers
Professor of Biology

DJR:gm

23 February 1968

Dr. Kenton Chambers
Program, Systematics
National Science Foundation
Washington, D. C. 20550

Dear Ken,

I am writing an unsolicited letter to support the efforts of North American Flora. As you know my major concern in these efforts deals with the proplem of information retrieval systems. I think that the procedures so far developed for using computers as support mechanisms for the development of Flora is good. I have offered my own support to the development of methodology for the use of the computer on F.N.A. studies and Stan Shetler has graciously accepted the offer and I have every confidence that we will be able to cooperate in the development necessary to support the F.N.A.

Sincerely,

David J. Rogers
Professor of Biology

DJR:GN

22 February 1968

Dr. Mason Hale
Department of Botany
Smithsonian Institution
Washington, D. C. 20560

Dear Mason:

Thank you for your hospitality and very fine dinner Monday.

We hope to have Bob Brill and perhaps George Estabrook as well to spend time with you on March 5, 6, and 7. Details of their arrival, etc. will be forthcoming. I hope that you will find their work useful and that we can make a start on the data in the type collection.

Somehow or other I did not get the Xerox copies of the programming techniques which Ken Ebbs had planned to give me. Could you ask him to send them on as soon as possible so that Brill and Estabrook can get a feel for "what's cooking"?

I am sending a copy of this to Stan.

Sincerely,

David J. Rogers
Professor of Biology

DJR:gn
Cc: Dr. Stanwyn Shetler

22 February 1968

Dean William E. Briggs
College of Arts and Sciences
HellemsBuilding

University of Colorado
Boulder

Dear Dr. Briggs:

I write to support the application of Dr. David W. Crumpacker as a new faculty member of the Department of Population Studies. Dr. Crumpacker was a colleague of mine at Colorado State University. As a member of Agronomy he had as his duty the studies of the genetics of maize. Dr. Crumpacker became interested in broader and more basic research problems during his tenure at Fort Collins, becoming concerned with the analysis of the genetics of populations. To further his interest in this direction he spent a year with the outstanding world authority in this area, Dr. Dobzhansky at Rockefeller University. Dr. Crumpacker has become outstanding in the field of population genetics and is a good teacher and a first class human being. He is young and vigorous and has achieved a world wide reputation at a relatively early age. He will enhance our program both in teaching and research.

I am certain he will attract both students and a number of grants to support his efforts. I recommend him highly.

Sincerely,

David J. Rogers
Professor of Biology

DJR:gm

19 February 1968

Dr. Donald F. Squires
Museum of Natural History
Smithsonian Institution
Washington, D. C. 20560

Dear Dr. Squires:

I wish to thank you for writing in support of my draft status appeal. You may be pleased to learn that the deliberations are finished and I have been reinstated as 1A. I am grateful for your contribution toward this end.

I look forward to the possibility of seeing you in Washington soon.

Very truly yours,

George F. Estabrook

GFE:gm

14 February 196888

Dr. Theodore J. Crovello
Dept. Biology
Univ. Notre Dame
Notre Dame, Indiana 46556

Dear Ted:

At long last, here are our comments on your paper, "The Effect of Chang of Number of OTU's in a Numerical Taxonomic Study."

There are some general points which may be helpful. George pointed out recently that there are two apparent approaches to the development of models for computing machines to be used in taxonomy. (There are others, no doubt.) One is to take the empirical approach, try it, modify it in terms of desirable or undesirable results until a satisfactory procedure is derived. The other way is to decide in advance what is wanted as a result, develop rules which convey the thought processes of the biologist, discover what mathematical model is necessary to develop the desired results, and then proceed to the programming. Clearly, there is no real boundary between the approaches, but I think that the differences are sufficient such that when a person favoring one over the other reads a paper from the other approach, he tends to criticize it in his own terms. That happened with your paper when I read it. That colored my remarks about it. I will point this out to John Reeder when you are ready to return your paper. It will help him understand what happened t the first time, and hopefully, let him see that there is no one royal road to the application of computing machines to taxonomy. I would clearly indicate in the paper that yours is the empirical approach.

Another general point which may be useful. Not so much what is actually said in the introductory statements as what can be read between the lines has an effect on the reader. There is a sort of feeling which comes off that "all numerical taxonomy is better than any orthodox approach." Since you clearly do not mean this to be the case, why put your work in a light where you have to fight straw men? I think that if you look back over the past literature on classification, you will find (though not necessarily explicitly stated) that any classification is effected by the number of objects used to make the classification. So a reader will have the first reaction - "We know this to be the case, so what's new?" What's new is that you can much m more precisely demonstrate how the number of OTU's do modify the concepts. If this is indeed your major thesis in the paper, then start out with the statement of the problem itself, and make no bows to taximetrics or numerical taxonomy, or any other blanket concept. Clearly, you aren't attacking any theoretical aspect of numerical taxonomy here, so why bother beating a dead horse, which is what you do in the first few sentences.

Another problem should be faced, if you want the results to get a clear reading. Any clustering method can be shown to produce different results dependent on how you structure your input data, how you include or exclude OTU's, or how you interpret the results of the clustering. Therefore, I'd suggest that you have confused the reader by using two clustering methods, neither of which can be understood unless he reads outside your paper. Many in the audience you are addressing do not know what Jim Rohlf's model is supposed to do, and certainly the explanation isn't sufficient to give a "feeling" for Tyron's. And the audience of Brittonia doesn't (as yet) really give a damn about the differences. For these reasons, I'd suggest you give a clear, brief, explanation of the methods in an appendix.

We have found that botanical readers get impatient with a large number of acronyms. You have supplied the editor with a much easier situation concerning space, but he isn't aware that you have done him a favor by using BDM, BSM, or SPAN diagram, particularly when you also designate your populations by other capital letter combinations. Too many such designations confuse rather than clarify. Why don't you redesignate your OTU's with sequential Arabic numbers?

Nearly related to this last point is the fact that you have used sites as the basis for OTU's in the same matrix with taxospecies. This is a less important point, but it is sure to cause some people to wonder how you make equivalent taxa out of the two. The fact that you use both "site" and "taxospecies" in the same matrix indicates (or may do so) that you consider the taxa equivalent in heirarchical level.

It would seem very profitable if you could build a summarizing chart to indicate which taxa are thrown together depending on the differing numbers of OTU's incorporated in the study, and according to the different clustering techniques.

Sincerely,

David J. Rogers
Professor of Biology

DJR:gm

13 February 1968

Dr. Robert Davidson
Department of Biology
The Catholic University of America
Washington, D. C. 20017

Dear Bob,

Here are the necessary documents to get you going on Similarity Clustering (GRAPH) and a start on Character Analysis (CHARANAL). The flow chart will be sent along on completion.

Have fun!

David J. Rogers
Professor of Biology

DJR:gm

P. S. Richard A. Barnes; Barss, Reitzel, and Associates, Inc. of 134 Mt. Auburn Street, Cambridge, Mass. 02138, (phone 617-

864-4320) has successfully converted our programs and might be able to give you some helpful hints if you have trouble.
to

12 February 1968

Dr. Theodore W. Hurst
333 N. Michigan Avenue
Chicago, Ill. 60601

Dear Ted:

I am answering for Dave as he is off with the flu. The 7th of March is OK and we will await confirmation. I am disappointed if for no other reason than that I expected to have a drink with you.

I am referring your letter to an industrial psychologist in Chicago who has a devious method of determining peoples' personalities. I am interested in the personality type expressed by such non-sequiturs as birthday - March 1, travel - March 7.

As ever,

Henry S. Fleming

HSF:gm

P. S. Could you send us out some preliminary data in the meantime? I'd like to get this kid started, if possible. Did you ever publish anything about this stuff, or even write a mimeographed sheet?

12 February 1968

Dr. Warren H. Wagner, Jr.
Department of Botany, Botanical Gardens
1800 North Dixboro Road
Ann Arbor, Michigan 48105

Dear Herb,

I'll try to cook up some kind of honorarium - after all, we are asking for advice on the establishment of a botanical garden and this has come to be recognized, I guess, as an activity worth money! Don't expect to pay your income tax with it, however. Let me know what's doing with you.

We have finally managed to reorganize the Biology Department at the university here. It is in its very early stages of reorganization now. Probably by the time you are here the bald outline will have been established and you should be able to see some progress.

I really do want to keep in touch with Steve Farris. Like so many of the rest of your output there I am sure he is a hot item and we just might be in a position to offer him a job here. I wouldn't mention this to him yet, however.

Let me hear from you when you are going to make the scene.

Sincerely,

David J. Rogers
Professor of Biology

DJR:gm

12 February 1968

Mr. N. Kenneth Ebbs, Jr.
Office of the Deputy Director
Museum of Natural History
Smithsonian Institution
Washington, D. C. 20560

Dear Ken:

Thanks for your cordial letter of the 6th. I have a call in right now to Stan Shetler concerning a proposed visit to you folks on the 19th. Ask Stan about details.

Sincerely,

David J. Rogers
Professor of Biology

DJR:gm

12 February 1968

Dr. Julia F. Morton
Morton Collectanea
University of Miami - Box 8204
Coral Gables, Florica

Dear Julia:

Thanks for the letter of 19th January. It is good to hear from somebody in economic botany. Since my departure from New York it seems I have been dropped entirely from the "in" crowd between Washington and Boston and I seldom hear what is happening.

You can see from the letterhead that I have moved over to Boulder. This came about as a much choicer job opportunity here than I had at Fort Collins. So if your niece has the opportunity to wend her way over to Boulder just give her the address above and we will be glad to see her.

Glad to hear of your activities and I still hope to come to see you sometime.

Sincerely,

David J. Rogers
Professor of Biology

DJR:gm

12 February 1968

Dr. B. L. Turner
Department of Botany
University of Texas
Austin, Texas 78712

Dear Bill:

I will be pleased to act as an off-campus member of Mr. Robert Adams' doctoral committee.

Thank you for the invitation.

Sincerely yours,

David J. Rogers
Professor of Biology

DJR:gm

12 February 1968

Dr. Edward Weiss
Director, Special Projects Program
Office of Science Information Service
National Science Foundation
Washington, D. C. 20550

Dear Dr. Weiss:

This is to confirm my trip to Washington to see you on the 19th. I will call your secretary during the morning to determine the time to see you..

Sincerely,

David J. Rogers
Professor of Biology

DJR:gm

12 February 1968

Dr. Ralph W. Richardson, Jr.
Rockefeller Foundation
111 West 50th Street
New York, N. Y. 10020

Dear Ralph,

I expect to arrive in New York on the morning of the 20th. If possible I would like to see you, say, about 11:00 A.M. that day. If this is not a convenient time, I will also have the afternoon available. I'll call you as soon as I get to a phone.

Sincerely,

Professor of Biology

DJR:gm

Taximetrics Laboratory
Department of Biology
Armory 101A
University of Colorado
Boulder, Colorado 80302

9 February 1968

Dr. H. A. Rodenhiser
Rockefeller Foundation
Apartado Aereo 58-13
Bogota, Colombia

Dear Rody,

I am sending along two copies in two separate mailings of the cassava studies report. These things take longer than I anticipate and I am sorry that it was not in your hands sooner.

After having gathered information through the good offices of Mrs. Tersillo I did not feel the need to have a visit with Dr. Jones at Stanford. I do hope, however, his advice will be sought on the appropriate occasion because I think the man has some tremmendous contribution to make with respect to the root crops and cassava in particular.

Please feel free to dismember this report and reassemble it in any manner you see fit. If there are sections which you feel inadequate I would appreciate knowing of these so I may help out further. As you can see, I have followed your outline but there may be other sections or questions which have not been adequately covered.

Let me know when you have had the opportunity to present this information in New York. I do hope that we will be successful in getting the institute section on root crops going.

Best regards to Mrs. Rodenhiser and Dr. Grant.

Sincerely,

David J. Rogers
Professor of Biology

DJR:gm

5 February 1968

Nelson G. Hairston
Director, Museum of Zoology
University of Michigan
Ann Arbor, Michigan 48104

Dear Dr. Hairston;

It was a pleasure to meet you at the Mexico City symposium. I gathered from our chat that you recently inherited a sizable mountain of museum data and are looking for an information retrieval system to handle it. We on the other hand are developing an information retrieval system for museum curation and related problems and are looking for suitable data banks for testing the powers of our system. It seems likely that we may be of service to each other.

To discover if this is indeed the case, we should probably get together for some serious talking, during the course of which you can explain to us the problems you face and we can explain to you what our system is capable of doing.

Our travel funds are nearly depleted for the time being, so we can't travel to Ann Arbor, but Dave Rogers joins me in inviting you to visit our shop and spend some time with us.

Meanwhile, let me just throw out a few questions that might help us get started. Do you have any computer hardware available to you, and if so, what is the name of the manufacturer and the model? Roughly, how big is your data bank? That is, how many specimens in the collection and how many characters are you interested in preserving? Before we're through we may have a lot to say to each other about characters, but for the time being, a rough guess will be of some help.

I hope we'll be seeing you and can look forward to a fruitful collaboration.

Sincerely,

R. C. Brill

RCB:gm
CC. D. J. Rogers

2 February 1968

Dr. Ralph Richardson
Rockefeller Foundation
110 West 50th Street
New York, New York 10020

Dear Ralph:

As you know, I've been working on a study report on yuca for Drs. Grant and Rodenhiser for consideration of the inclusion of this crop in the work of the new institute to be established in Palmira. I have just completed the first draft of the report, and will send it off to Dr. Rodenhiser, hopefully on Monday.

One of my strong recommendations in the report was that a computer be installed in the institute to allow rapid correlation and retrieval of the data derived from the primary studies, not only on yuca, but on all the various crops and activities to be included in the institute's work. Having made that recommendation, I began to think that such a facility would be a valuable adjunct in all of the various institutes around the world, as well as other projects as the germ-plasm banks for corn, wheat, etc. As a matter of fact, I met Dr. Mario Gutierrez G. in Mexico just before Christmas. He is anxious to use some sort of computer program for the retrieval of information about the Maize Germplasm Bank at Chapingo.

Many different groups and workers want to get going with computer programs, but most of them are at a loss when it comes to the problem of g getting a computer to work for them. With this problem in mind, I thought it might be well to tell you (and others of the Foundation who might be interested) about the work we have already done in the field of data correlation and information retrieval. My group and I have worked for some years (as you know) on these problems, and I think that we have both useful programs and know-how which could be of tremendous assistance to people in the various agricultural endeavors. Our team is unique, I think, in that we have had experienced biologists, mathematicians, and programmers working together on problems of data processing fro biology and agriculture for a total of 23 man-years. We have not only worked from our own interests, but have had the collaboration of a number of different types of biologists whose problems have widened our scope to a point where we feel that we understand the needs of most endeavors in agriculture and biology. Our experience has paid off recently in the development of a very powerful computerized biological IR system. This system is nearing completion, and will be ready for demonstration by July of this year.

We would like to put our talents and the IR system to work, and would like to explore possibilities of collaborating with the many teams which you support. We could, for example, act in an advisoryccapacity for those who want to get a particular set of data into a data bank for retrieval. In other cases, we could actually enter into the operations for a sufficient length of time to train both biologists and computer experts in the proper procedures, and while during the training period, actually produce results meaningful to the work at hand.

I do not have any concrete proposals for such collaboration at the moment, but would like to explore the possibilities with you. Since I have to be on the east coast on February,19, I would be pleased if I could come talk to you on either the 20th or 21st. If possible, I would also like to talk to the people in the Ford Foundation who are working with you in the development of the various institutes and programs around the world, However, I would leave it to your discretion about inviting them in for talks.

Can you make it on either of the days mentioned above? If not, and you find the possibilities interesting, could you tell me when you do have some free time (Is there any such?). Perhaps I could call you next week, say the 8th or 9th, to make arrangements.

Sincerely,

David J. Rogers
Professor of Biology

DJR;gbm

2 February 1968

The Hon. Donald T. Brotzman
1330 Longworth Building
Washington, D. C. 20015

Dear Mr. Brotzman:

Thank you very much for the extensive and very useful documents on cassava. They will prove very helpful and we are all grateful for your staff's efforts on our behalf.

Very sincerely,

David J. Rogers
Professor of Biology

DJR:gm

Feb. 1, 1968

Dr. Alfred Jones
Georgia Coastal Plain Experiment Station
Tifton, Georgia 31794

Dear Al:

We'll be glad to see you on the date you recommend. I suggest that if at all convenient, you plan to be here til Friday, March 1, so that we can actually work over some of the results with you, after a run on the computer.

Let me know your plane schedule, flight no., etc., to Denver, where I'll plan to pick you up. We'll have a bed for you at our house.

Looking forward to seeing you.

Sincerely,

David J. Rogers

Feb. 1, 1968

Dr. Ed Weiss, Program Director
Special Projects Program
Office of Scientific Information Services
National Science Foundation
Washington, D.C. 20550

Dear Dr. Weiss:

I enclose a short progress report for our grant GN 656. We feel much encouraged about our project so far, having actually completed things we hadn't expected to be done for another 6 months.

I hope to be in Washington on February 19th. Will you be available then? I would like to see you in the morning of the 19th, if at all possible. I'd also like to stop in for a minute to see Ernie Sohns the same morning. Would you please let him know of my appearance that day?

I hope that we can get together then, for I have also to get together with some of the Smithsonian crowd.

Sincerely,

David J. Rogers
Professor of Biology

Progress Report to NSF, January 31, 1968

A BIOLOGICAL INFORMATION RETRIEVAL SYSTEM

NSF GN 656

David J. Rogers
University of Colorado
Principal Investigator

This informal report is written to keep OSIS informed of developments with respect to the several aspects incorporated in the production of a generalized biological information retrieval system. We are pleased to report that, overall, we have progressed more rapidly than we had thought possible.

The most significant progress so far has been the discovery of a new space and time-saving storage and retrieval technique. This is described in a paper entitled "Compressed Characteristic Functions as Inverted Information Files" now being reviewed for publication by the Association for Computing Machinery. A pre-publication copy of this paper in enclosed with this report.

The XPOP processor which we plan to use as a software base upon which to build the BIRD and TAXIR systems is not yet available to us in its final projected form. Work is going forward at IBM in San Jose, California, to perfect this system to the point where we can use it to advantage. Meanwhile we are implementing a preliminary working version of the TAXIR system using the FORTRAN language for the CDC 6400 computer. While this preliminary version will not have the design flexibility of the ultimate XPOP-based system, it will incorporate the new storage and retrieval technique, will retrieve efficiently, and will be ready for operation sooner than our original plans called for. Our present target date for an operating TAXIR information retrieval system is June of this year.

Software Developments

The programs which underlie the whole IR system may be considered in two aspects, (1) design and (2) implementation. These are not completely separable in either time or personnel. The design aspect contains four levels:

I. Overall conception of the system;

II. Conception of language and scan, of which queries and data maintenance aspects are a part;

III. Conception of indexing and machine configuration;

Iv. Design of specific function-performing modules.

Parts I and II are complete, part III is virtually complete, and Iv is just started.

The implementation aspect is in three phases:

I. The coding of function-performing modules;

II. The debugging of these modules;

III. The collation of these modules into an integrated system.

Of these, certain parts of part I have been started, but no debugging or collation has yet been done.

Biological Input as Test Cases for TAXIR

According to our plans, data from the genus Manihot would provide the primary set of data for testing of the TAXIR system. Work on the preparation of these data as input has progressed more rapidly than anticipated, and the information on several thousand specimens has been prepared, each specimen described by about 40 descriptors (the number of descriptors varies from specimen to specimen, but the average is 40).

Our goal of collaboration with the Natural History Museum of the Smithsonian Institution has progressed to the point where we expect to receive data describing the type specimens (approximately 60,000) housed in the U.S.

National Herbarium. This data bank should provide an excellent test of our IR system, as well as an example of the way the system can be employed. If possible, we will set up a demonstration of our IR techniques with data from the type specimens some time during the coming summer. Notification of this demonstration will be given in sufficient time to allow interested people to schedule their time to view the demonstration.

Several other data banks are being sought as demonstration material, but it is not certain that any one of these will actually be available to us. There are many problems involved in getting data banks. These are largely in the realm of getting investigators attuned to the ideas and purposes of any IR system. Part of our ongoing efforts must be essentially a public relations type of effort to make a good system actually a working system.

Economics of the Proposed System.

With respect to the cost-accounting and economic impact aspects of this proposal, some new arrangements have had to be made because the investigator named in the grant proposal, Dr. Paul Barkley, has moved from Colorado State University to Washington State University, Pullman Washington. Because of his move, and concomitant changes in his job-requirements, Dr. Barkley has had to withdraw from collaboration. We are now in contact with Dr. Bernard Udis, Director of the Bureau of Economic Research, University of Colorado, and hope that he (or members of his staff) will be able to take up the collaborative efforts originally proposed. Decisions on this collaboration should be made some time during the month of February. This aspect of the proposal is of great significance, and I have no intentions of allowing this aspect to be deemphasized.

Feb. 1, 1968

Dr. J. M. J. de Wet
Department of Agronomy
University of Illinois
Urbana, Illinois 61801

Dear Dr. de Wet:

Please forgive me for the long delay in answering yours of Jan. 3. I am sending along the requested copy of our paper in Evolutionary Biology.

I have a student at the PhD level working on the systematics of Manihot who would profit very much from your course on the origin and domestication of crop plants. The question is, how? When is the course offered, and would you be willing to take a student from our department? He has had a course in karyology here, and will have had my course in taximetrics by the end of this semester.

Let me know how you see the arrangements, and we'll try to work out something.

Thanks for writing, and I hope we can work out some suitable arrangements for exchange.

Sincerely,

David J. Rogers
Professor of Biology

February 1, 1968

Dear Dr. White:

We will be very pleased if you can arrange to visit us on Monday and Tuesday, March 25,26. Unfortunately we will have a visitor on the earlier proposed dates in February. If you will be coming up from Mexico City, may I suggest that you travel via LosAngeles to Denver? I think the service on the only other way to come, via Dallas, is rather poor. I have had rather poor service from Braniff Airlines, which flies the Dallas route.

Whichever way you decide to come, however, we will be glad to meet you in Denver and drive you over to Boulder. Just give us the time, and Flight number of your arrival in Denver. We will arrange accomodations for you.

I am in full accord with your proposal for a series of papers in The New Phytologist, where actual problems and their solution are used as examples of methodologies in taximetrics. I am also pleased that you are willing to be the "interpreter" to the taxonomic public. This is an important issue, and we have struggled with presentations which attempt to write in a style intelligible to those whose mathematical sophistication is not all that one could wish. This is a very difficult task because the vocabularies of the two disciplines are frequently at odds. I have read hurriedly through yours and Ian's paper on the Chrysobalanaceae, and find that it is all right, with a very few exceptions. We will have some suggestions for you, if your time schedule will permit delay until you arrive here in Colorado.

Since a number of new ideas have been developed since the original work with Ian, we would rather explain some of these, with relation to a general discussion of taximetrics, face-to-face. However, if you need to have our comments about the paper earlier, we will attempt to give you the benefit of our thinking in a letter. Again, let me know.

We will be pleased to have Bisby work here with us. If it is possible for him to spend an academic year with us, we will have some funds to help him, but these funds will be available only during the period Sept. 1, 1968 to June, 1969. We can discuss this possibility while you are here.

We look forward to your visit with great pleasure. I trust that we can make it profitable.

Sincerely yours,

David J. Rogers
Professor of Biology

P.S.

I will be pleased to have my name appear with yours and Ian's on the paper, in any way you may choose.

29 March 1968

Dr. Dorothy Parker
Rockefeller Foundation
110 West 50th Street
New York, New York 10020

Dear Dr. Parker:

Dr. Rodenhiser has asked that I amplify my report in a couple of directions for the new studies that they wish to develop in Colombia. If possible I would like to take advantage of the good offices of Miss Tersillo to make some more searches of the literature for me.

The search area of interest deals with the production of proteins by microorganisms using plant carbohydrates as the base for the cultivation of the microorganisms. Dr. Rodenhiser in his last letter sent along a list of possible references that might be interesting to examine in relation to this particular aspect of things. I am forwarding this list to you, and the list has marked intries on it which I think might be interesting. The purpose of sending the list is to give Miss Tersillo an idea about the kinds of references that might be useful as she goes through searching for this kind of information.

I would like to ask another favor of Miss Tersillo if this is at all possible. Since our library resources here in Colorado are relatively limited and do not contain some of the reference materials which are listed I wonder if it would be possible to ask for Xerox copies of each of the papers marked on this list; unless of course they turn out to be a whole book, which would then make it necessary for me to borrow it.

My major concern is as mentioned above - the relationship of microorganisms to protein production from plant carbohydrate sources. I would like to ask in addition if Miss Tersillo could discover if there are any references available to her which discuss the storage of roots after harvesting, particularly Manihot roots. I have the following references concerning this, but these publications are not available to me and they probably are available somewhere in the Washington area. These references are:

Subramanyam and Mathur, Bull. cent. Fd technol. Res. Inst., Mysore, 1955-56, 5, 110

Majumder, Ibid., 1954-55, 4, 164

Majumder et al., Ibid., 1955-56, 5, 108

Kirpal Singh and Mathur, Ibid., 1952-53, 2, 181.

There may be other references to the storage of Manihot roots, but I am not sure that I know what they are.

I trust that I am not overburdening Miss Tersillo for this work. Thank you for your assistance.

Sincerely yours,

25 March 1968

Dr. Herman Goldstine
T. J. Watson Research Center
P. O. Box 218
Yorkstown Heights, New York 10598

Dear Dr. Goldstine:

You may recall that we were fortunate enough to receive funds from you to reprogram, document, and flow chart some programs on classificatory procedure. Due to our change of location we had to shift again from one machine to another, but since moving here to Boulder we have completed the reprogramming, documenting and flow charting of a program which we started to work on at the time of our grant from you. The program is now written in FORTRAN IVfor the CDC 6400. Since this is not immediately written for any IBM machine, I am wondering if there is any use in sending the documented, flow charted program to you or some other agency of IBM. I would be pleased to follow your suggestion.

Since last summer our research team has been developing (under a grant from the National Science Foundation) an information retrieval system for biology called TAXIR. We expect the first version of TAXIR to be running for demonstration onthe CDC 6400 by sometime this coming summer.

According to our original proposal to the NSF we planned to implement our system via an extremely powerful and flexible language processor called XPOP, developed by Mark Halpern at Lockheed Missiles and Space Company for the IBM 7094. When we learned that a CDC 6400 version of XPOP could not be prepared in time for our first implementation effort, we decided to build the preliminary version of TAXIR using CDC FORTRAN IV. This implementation is well underway.

We've recently learned that Mark Halpern has left Lockheed and has joined the IBM staff at San Jose, Calif. As we are still very much interested in using XPOP for the next, more sophisticated, version of our system, we would like to impose on your good offices to try to discover whether IBM has any plans to use Halpern's ideas on macro-processing to build an IBM "XPOP" or its equivalent. To our knowledge there is no other language processor in the field or under development with quite the range of powers displayed by XPOP or which is quite so suitable to our needs.

You may note that TAXIR - version I - will run on CDC equipment. This, of course, is because we are obliged to use the University of Colorado's hardware for our initial development and testing. However, a number of potential collaborators from other institutions housing large collections of biological material have shown interest in having TAXIR mounted on their hardware. In particular, we are engaged in preliminary discussions of this nature with Dr. Nelson Hairston, Director of the Museum of Zoology at the University of Michigan, who is in charge of automating the records for animal collections numbering over 6.25 million specimens. The computing machinery available to him is an IBM 360, Model 67.

Again, I will be pleased to have any information you may care to give me about the potential availability of "XPOP." Thank you for your considerations.

Sincerely,

David J. Rogers
Professor of Biology

DJR:am

22 March 1968

Dr. Kenneth H. Zabriskie, Jr.
BioSciences Information Service
2100 Arch Street
Philadelphia, Penna. 19103

Dear Ken,

Some weeks ago we sent you a preprint of a paper entitled Compressed Characteristic Functions as Inverted Information Files, Estabrook and Brill. This paper describes the basic concepts of the system which we are presently composing. This system acts as an accessioner for a master information file (such as a card catalogue, office file, Herbarium, or even machine readable copies of card files, etc). This system processes locating information (information for use in accessioning the master information file) into the characteristic functions for the subsets of the items which correspond to locating descriptor states. Boolean searches may be made by direct simultaneous calculations with the characteristic functions rather than by conventional file searching. The overriding difficulty of this approach is that while it renders the accessioning process extremely efficient in terms of machine time, it is extremely costly in space as it will be necessary to store a characteristic function for each descriptor state. With 30 or 40 thousand descriptor states this would lead to real problems.

Any collection of subsets of a set may be thought of as a topology for that set. In this sense the dedescriptor states for a set of items m may be thought of as a topology. A base topology for a topology for a set is another, much smaller collection of subsets, with the property that any subset in the topology may be reconstructed by taking the appropriate intersections, unions, and complements of the appropriate sets in the base topology. What we have done is to define a base topology for the descriptor state topology.

A "Compressed Characteristic Function" is a member of this base topology. We need now store only the characteristic functions for sets in the base topology as the original topology may be reconstructed from these by direct calculations with these characteristic functions. This procedure results in a striking space savings , (a descriptor with X states formerly requiring X characteristicsfunctions now requires only $[\ln_2(x)]$ such) but does not lose us the capability to search by direct simultaneous calculation. Thus an accessioner built from compressed characteristic functions (base topologies) would be efficient in both time and space.

Although we have made a great effort to familiarize ourselves with current work in Information Retrieval we would be most grateful if you would do us two favours.

1. Give us your critical comments on our paper and our work.

2. Suggest references (and researchers) which may be related to our ~~o~~ efforts.

If you would be willing to share with us your knowledge and experience in this field we would value your help.

Very truly yours,,

George F. Estabrook.

GFE:gm

P. S.: Please ignore the Appendix. I will send you a revised/corrected appendix in the next few days.

21 March 1968

Prof. Mahinder S. Uberoi
EC OT 6-13
Boulder Campus

Dear Dr. Uberoi:

This letter supports the recommendation of Dr. Askell Löve to grant George Gaylord Sompson the Doctor of Science (Hon.) degree.

No other name is better known in the biological sciences than Dr. Simpson's. The basis for this is his outstanding contributions in many phases related to the biological and geological sciences. He is one of the elder statesmen of biology. Dr. Simpson's contributions range from paleontological studies through a successful textbook of statistics for biologists (written with his wife, Anne Rowe), plus a large number of students inspired by his teaching.

It is difficult to understand why Dr. Simpson has not before received recognition from this University, and I recomment that no more time be lost in giving him the DSc.

Sincerely,

David J. Rogers
Professor of Biology

DJR:gm
CC: Dr. Askell Löve

21 March 1968

Dr. Roger Revelle
Center for Population Studies
Harvard University
9 Bow Street
Cambridge, Mass. 02138

Dear Dr. Revelle:

We are pleased to receive your generous offering of descriptive literature on population studies. These will provide us with some background for the development of a suitable program.

We intend, I think, to approach population studies more from the non-human angle but hopefully the study will contribute an understanding of populations generally.

Sincerely,

David J. Rogers
Professor of Biology

DJR:gm

Taximetrics Laboratory

Armory 101A

19 March 1968

Dr. J. C. Gardin
Centre d'Analyse Documentaire pour l'Archeologie
31, chemin Joseph-Aiguier
13 - MARSEILLE 9e
France

Dear Dr. Gardin:

It was a pleasure to hear from you. I have read the document, Plans for an International Symposium ... on the Use of Computers in Archaeology: with interest. I am impressed with the effort which has been made for the preliminary planning of this sympolum as evidenced by this document. The areas of concern delimited in this document are particularly appropriate to the problems encountered in introducing computer methodologies to a science such as archaeology. I am particularly encouraged by the attention you have given to problems inherent in the attitudes which practicing scientists in this field may have toward the use of computers as aids in their work. I firmly believe that computer methodologies must be designed to meet the specific needs of the working scientists. Only through close cooperation and dialogue among computer scientists, mathematicians, and archeologists can this objective be met. Only when this objective is met will it be clear to the working archeologist that computing machines, rather than usurp his professional prerogative, can further his scientific objectives.

The formal skills which I can bring to such a dialogue are those of a combinatorial analyst. The experience which I can bring to such a dialogue is four years of close cooperation as a combinatorial analyst with computer scientists and biologists whose professional community reflects attitudes very similar to those you forsee in the community of archeologists (section d, page 1 of Plans).

The archeologist is the most important member of this dialogue and the endeavor should begin with him. Perhaps next, with the help of the mathematician, he can define the problems and goals of his science with special attention to the question: Which problems might most appropriately be investigated with the aid of a computer? When problems have been defined and isolated, mathematical considerations can be brought to bear in full strength. The computer scientist is the last to enter this dialogue with the implementation of computer systems. I regret that, in at least some cases in Biology, too little attention is paid to the beginning stages of the dialogue where the scientists, in whose aid these techniques are being developed, describes and defines his problems and objectives; and too much attention is paid to considerations of computer technology. This practice results in sterile or spurious techniques which substantiate, rather than allay, the fears which are typical of some of our colleagues. It is my hope that the conference presently

being planned is committed to the initial stages of the dialogue - the recognition and description of the problems in archeology which might be productively approached with the aid of a computing machine. Were the symposium to encourage discussion of computer technology or mathematical techniques designed outside of the context of archeology, I'm sure you realize that much of your stated purpose would be defeated.

From the information which you have made available to me so far, it would seem that this symposium will provide a meaningful and essential dialogue. I would consider it a privilege to be included. Even if it is not possible for you to extend me a formal invitation, I would be pleased to receive news of planning progress and proceedings.

Very truly yours,

George F. Estabrook

GFE:gm

19 March 1968

Dr. G. T. Prance
New York Botanical Garden
Bronx Park,
New York, New York 10458

Dear Ian,

Please check your field note of specimen #2389 with the statement:

"Capoeira on high sloping bank at Terra Firme on Rio Purus opposite Boca do Acre. Scandent, flowers white, fruit green, ribbed leaves, and young stems all green, woody stems grey."

I am interested to know whether the punctuation is correct after "... fruit green, ribbed leaves, ..." or should it read "... fruit green, ribbed, leaves ..."

Thanks.

Sincerely,

David J. Rogers
Professor of Biology

DJR:gm

19 March 1968

Dr. Calvin C. Gotlieb
Institute of Computer Science
University of Toronto
Toronto 5, Ontario

Dear Dr. Gotlieb;

We are interested in the reviewer's comments on "Compressed Characteristic Functions as Inverted Information Files," by Brill and Estabrook, and would be pleased if the reviewer would give us a reference or two where the type of effort we described may be found. He has indicated that our methodology is standard and is found in any number of applications.

Thank you for your assistance.

Sincerely yours,

David J. Rogers
Project Director

DJR:gm

18 March 1968

Dr. Richard M. Klein
Department of Botany
Hills Building
The University of Vermont
Burlington, Vermont 05401

Dear Dick,

I am sending back under separate cover the manuscript of the Economic Botany book. The reason for sending the thing to you now is to ask your advice. I have done no work on it since last summer. Enclosed with the manuscript is a copy of a letter from Sally Bates, Associate Editor of the N. H. P. This is the major problem I have with the thing. IN that letter it is stated that my manuscript is much too short, and that much more is needed.

Way back when I began this thing, when I submitted one chapter as an example of the book that was to be written, the chapter was the one on wheat. When I sent that in Jake Page was the guy doing the reading and he said that I should not have anywhere near that length; otherwise the book that I was projecting would be nearly four hundred pages long. With Jake's recommendation I went ahead and shortened the book and used the conceptualization that it would have to be shorter; and built the book around the idea of a shorter one. Now this dame comes along and wants me to pad the thing out a little bit. I'm not sure that it is worth it. If it is let me know.

Even if I do decide to expand and add more material to the manuscript it will not be along the lines that have been suggested by this editor, who incidentally may be very good as far as "Englishing" sentences, but when it comes to being any kind of an individual with brains in her head I find her pretty stupid. If I decide to put anymore into this book, it will be something on the order of root crops, crops for special purposes, and so forth; it will not be just padding out of the chapters. But my question to you is, Is it worth it?? Haven't I got the ideas about the things I am looking for here. I find that her argument that they cannot bind less than 120 pages, or whatever it is, is something of a ridiculous statement. If this were the case, then how in the hell do they dictate all the different kinds of books that they've got. How long is a piece of string, anyway?

What I would be particularly appreciativeof, is if you would go through and see which of the corrections that Sally Bates made on this manuscript would you accept and which you find ridiculous. I would just like to have an independent opinion on this subject. Please makk those with red ink that you find unacceptable, which would then tell me whether I've been too senstitve about criticism.

I've included copies of the illustrations, and I want your comments on them. They can pad out the pagination by at least a few more pages. I'll follow your suggestions, if they be not too painful.

Sincerely,

David J. Rogers
Professor of Biology

DJR:gm

15 March 1968

Dr. Richard M. Klein
Department of Botany
Hills Building
The University of Vermont
Burlington, Vermont 05401

Dear Dick,

Just a note to let you know that I have your 5 March letter. I am going to work on the manuscript a little bit this weekend and will have more to say sometime next week.

Yes, I want my book in with the first bunch. Yes, you will see something from me soon. Another letter next week...

Sincerely,

David J. Rogers
Professor of Biology

DJR:gm

14 March 1968

Dr. G. T. Prance
The New York Botanical Garden
Bronx Park
New York, New York 10458

Dear Ian,

I am returning your specimen collected with Penna and Ramos, #2866. I believe this to be Hevea. Sorry I can't give you any better naming on it. Would you be kind enough to annotate the loan sheet which I recently returned with the fact that I have returned it.

Are the details of White's transportation well firmed up? I do not remember whether he was to notify me any further. I have his flight number, etc., but would like a confirmation if he can give me one.

Sincerely,

David J. Rogers
Professor of Biology

DJR:gm

12 March 1968

Dr. R. S. MacNeish
Department of Archaeology
The University of Calgary
Calgary, Alberta, Canada

Dear Scotty:

Thanks for your letter of March 1. First let me answer the questions as given. Unfortunately I have not heard anything about the Eighth International Congress of Anthropological and Ethnological Sciences and no one has written from Japan inviting me to come. Secondly, I would be willing, indeed pleased, to come to the conference. Thirdly, you are probably aware of the very strict cutdown on international travel funds from any federal agency. This has had a serious effect in several directions, but the most critical one as far as my own chances of funds are as follows: everybody is this country is now going to the private sources of funds (such as Rockefeller). This overburdening of requests makes it difficult for them to honor any of them. It would therefore be difficult for me at this stage of the game to pick up any support for travel.

The proposed outline for the symposium is indeed exciting and I will be pleased to be included in this group. Thanks for your invitation. I hope it can be arranged for me to participate.

Sincerely,

David J. Rogers
Professor of Biology

DJR:gm

11 March 1968

Dr. Daniel F. Merriam, Editor
Computer Contribution Series
State Geological Survey
The University of Kansas
Lawrence, Kansas 66044

Dear Dr. Merriam:

Thank you for sending your brochure on computer programs and publications. I was interested to know that the contributions mentioned by you as being of special interest are ones for which we have our own programs.

Your idea for advertising programs seems a worthwhile one and in time such activity may prevent the "reinvention of the wheel" in each computer center.

Sincerely,

David J. Rogers
Professor of Biology

DJR:gm

11 March 1968

Dr. Donald F. Squires
Museum of Natural History
Smithsonian Institution
Washington, D. C. 20560

Dear Don,

The abstract as I presented it is satisfactory for publication. Extra copies are enclosed in case you need them.

Write me when you have a minute and tell me about the Stony Brook deal. Do you really want to go to such a notorious institution?

Sincerely,

David J. Rogers
Professor of Biology

DJR:gm

7 March 1968

Mr. David G. Leach
15 Caldwell Street
Brookville, Penna. 15825

Dear Mr. Leach:

Thank you for your letter of February 29. Let me give you some background information concerning our activities, and this will perhaps lead to some suggestions about cooperation on some of the very important activities outlined in your letter.

Our major effort is to discover useful ways to employ computers for a variety of activities, mostly those which are part of taxonomy. We have to employ a variety of disciplines in order to carry out these aims, including botanists, zoologists, mathematicians and computer programmers. Some examples of work that we have already done are classification procedures which reflect the botanist's general methods of making classifications; procedures to test the value of characters for taxonomic purposes; procedures for ordering very large lists of objects; and now, our latest venture, procedures to put into computer programs the many items of information which describe plants and animals. In this last work, we have developed a very efficient set of procedures for storing information in the computer in such a way that we can ask a variety of questions about the stored information. We feel that our efforts in this endeavor are unique, in that our major interest is the development of a system for incorporating exactly the type of information which is most interesting in the A.H.S. That is, we are as much concerned about the primary data which exist on file cards or in file cabinets as we are in the information to be derived from published sources. This has not been the major push by most other workers in the field of information retrieval.

We also feel that our efforts are unique in that we put together, as a team, those who are involved with the primary data (such as myself and Henry Fleming), those who can develop the most efficient mathematical methods for the storage and retrieval, and those who are most knowledgeable about making the computer do the things we want done. Most frequently, information retrieval systems are designed by specialists in information retrieval, but who know very little about the desires and demands of those for whom they intend the systems. We do not feel that we should say anything about our system until we have actually tested the procedures on actual problems. This we have done, and while we have many more aspects of design and programming to do, we feel sufficiently confident in our programs that we are now willing to make "advertisements' to interested workers. Since our work is supported by the National Science Foundation for the development of the information retrieval system, we consider our programs to be in the public domain, not private nor patentable, and therefore free for the asking.

Another aspect of our work which I feel is worth mentioning to you is the procedures we have for collaborating with other interested workers. First of all, we do not feel that all biologists should become experts in the computer field, since it is almost impossible to keep up even with the disciplines of biology. With this feeling, it becomes essential that someone who has built up the competence be willing to share that competence with working biologists. Since our group "speaks both languages" of biology and the computer field, we can most frequently be of service to the interested biologist, or suggest others who can give the needed service. We have an almost continuous stream of biologists visiting with us, determining how we may cooperate with them. Last week, for example, we had a USDA worker from Georgia visiting us to learn appropriate techniques for his study of sweet potato breeding. A number of botanists have already been supplied with information run through our programs. Zoologists as well are invited, and frequently do make use of our procedures. We can't help them all, but at least they know what can and can't be done. Frequently we will run the biologist's study on our computers here because it is much easier to use this equipment rather than go to the very-great difficulty of transferring programs from one computer to another. However, if the biologist has computer facilities and good programmers available to him, we frequently hand him a "program deck" which he can use on his own hardware. I might say that very few biologists take this latter option.

With this background, let me make a few suggestions. First of all, as I mentioned in my letter to Russ Seibert, it would be well to have a well trained "roving ambassador" to the biologists (and you may note that my definition of biologists definitely includes horticulturists) who would keep the biologists abreast of the most modern methodologies for information retrieval, so that there would not have to be "reinvention of the wheel" for each different application. We do not at present have such an individual available, but would be willing to train him. (This is also part of our objectives.) Secondly, we would ourselves be pleased to aid A.H.S. in its efforts to mount an information retrieval system for the various endeavors you listed. I do not think that all the procedures for all of the listed endeavors are worked out yet. That is, a slightly different procedure will be needed for such activities as a catalog of horticultural and botanical books than will be useful for institutional plant acquisition records. I think this can be seen. The problems will have to be worked out for each, to discover what procedures will actually be most useful, and the problems are in the area best defined as the use to which each information bank will be put. Thirdly, we will be pleased to consult on the most appropriate computer configurations for the various activities. In this area, knowledge of various computer characteristics will be an important operation. Clearly, some machines cannot be employed while others may be marginally useful, and still others adequate.

I should make it clear that we do not anticipate that Boulder, Colorado, become the place where the information retrieval system for A.H.S. be established. The is your choice, not mine. We may run test studies here, but - nothing permanently. Test studies would be charged for actual computer time and for necessary card-punching (or paper tape) and paper used. We feel it vital to keep our interests in the research necessary for new development,

and would, therefore, not enter permanently into A.H.S. work. We merely wi wish to recover expenses for our work. This might include part-time salary, travel and perdiem expenses, and consultation fees. Note the conditional statement - we have no fixed fees.

I trust that this gives you some ideas for potential relationships between A.H.S. and this group here. As you may know, Dick Howard will be here in Boulder on March 11 and 12. He has indicated that he hopes to spend some time with us during his visit. Perhaps you can get some better ideas from him after he has actually been with us.

Once again, thank you for your letter. I hope we can be useful in your ambitious program.

Sincerely,

David J. Rogers
Professor of Biology

7 March 1968

Dr. Kenneth H. Zabriskie, Jr.
BioSciences Information Service
2100 Arch Street
Philadelphia, Penna. 19103

Dear Ken:

Enclosed is the paper I mentioned which makes efficient the storage of bit strings. This also gives you a little line on the rest of the program. The several aspects of programming such as scanning, queries, identification of query type, etc. are well along. We hope we can put on a demonstration this coming summer of at least some data.

Thanks for your call; we'll keep in touch.

Sincerely,

David J. Rogers
Professor of Biology

DJR:gm

4 March, 1968

Dr. Roger Revelle:
Harvard School of Public Health
655 Huntingdon Avenue
Boston, Mass.

Dear Dr. Revelle:

Having just formed a group for population studies here, with several biological disciplines involved, we would like to ask you for some of your ideas about the general drive and philosophy of your population studies group there at Harvard. Since we have not established the scope nor central unifying theme (if there need be but one) within our group, we would like to have your ideas on the subject. Have you any published information on population studies which you can share with us? We will be pleased to have any material describing your department (or institute) you care to send.

Thank you for your efforts.

Sincerely,

David J. Rogers
Department of Biology

DJR:gm

4 March 1968

Dr. C. C. Gottlob, Editor JACM
University of Toronto
Toronto 5, Ontario

Dear Dr. Gottlob:

Can you please tell me the fate of a manuscript sent in for publication in the Journal, first sent to Dr. Anthony Ralston? The paper, entitled "Compressed Characteristic Functions as Inverted Information Files" by George F. Estabrook and Robert C. Brill was submitted 28 November 1967. On the 2nd of January we forwarded to Dr. Ralston some changes discovered to be necessary in the manuscript.

Since we understand the paper has been moving about the country we wonder whether both the manuscript and the changes later submitted have reached your hands, and if possible we would be pleased to know whatlis the present status of the paper.

Sincerely,

David J. Rogers
Project Director

DJR:gm

4 March 1968

Dr. Robert D. MacDonald
University of Tennessee Arboretum
Oak Ridge, Tenn. 37830

Dear Bob:

I very much appreciate receiving a copy of your enthusiastic letter to Russ Seibert. We look forward to seeing you in April. When you have firmed up your plans let me know and we will arrange to meet you in Denver and take care of housing.

Sincerely,

David J. Rogers
Professor of Biology

DJR:gm

P.S. Dick Howard is going to be here either the 11th or 12th of this month.

4 March 1968

Dr. Nelson G. Hairston
Museum of Zoology
University of Michigan
Ann Arbor, Mich. 48104

Dear Dr. Hairston:

All other things being equal we would be pleased to see you in the week of May 6, and the days Monday and Tuesday, the 6th and 7th. I hope this is convenient to you. Let me know when you have had a chance to firm up your plans and we will arrange a room for you and meet you at the airport in Denver.

Sincerely yours,

David J. Rogers
Professor of Biology

DJR:gm

4 March 1968

Dr. Jerome H. Maner
Animal Science Department
Iowa State University
Ames, Iowa 50010

Dear Jerry:

Would you be kind enough to send me all the reprints you have giving production data with yuca as the fedding medium? I would be pleased to receive them.

Sincerely,

David J. Rogers
Professor of Biology

DJR:gm

4 March 1968

Dr. Howard S. Irwin
c/o New York Botanical Gardens

Dear Howard:

In the course of a new piece of work that I am cooperating on with a geneticist from the USDA we are trying to round up wild species of Ipomoea related to section batatas. There is "one species" known as I. nitida which may grow in your area. It has a sweet potato looking flower (rather globose at the base of the corolla tube) and round leaves with considerable pubescence. The plant has an enlarged root. If you could get seeds as well as specimens of this plant I'd be happy to have them.

I look forward to contacting you about computer activities on your return to New York. Things are well here.

Sincerely,

David J. Rogers
Professor of Biology

DJR:gm

over

4 March 1968

Dr. Ian Prance
New York Botanical Garden
Bronx Park
Bronx, New York

Dear Ian,

Would you please put an appropriate address on the enclosed letter for Howard?

Thanks.

Sincerely,

David J. Rogers
Professor of Biology

DJR:gm