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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.

THE UNIVERSITY OF MICHIGAN
ANN ARBOR, MICHIGAN, U.S.A. 48104

MUSEUM OF ZOOLOGY

October 27, 1969

Gil Hersh
Department of Biology
University of Colorado
Boulder, Colorado 80302

Dear Gil,

The following are the majority of the corrections in the salamander data bank. These are listed according to the description list. Let me know if you need additional information.

Best regards,

Arnold G. Kluge,
Curator and Associate
Professor

AGK:smj

Correct	Incorrect
9. Species	
Glutinosus	Glutinosum
Yonahlossee	Youahlossee
robertsi	robertosi
viridescens	irridesceus
viridescens	viridesceus
viridescens	virides
laterale	lateral
tigrinum	tigrinuns
chiropterus	chiropeterus
chiropterus	chiroptera
ochrophaeus	schrophaeus
quadramaculatus	quadrinaculatus
porphyriticus	poepluriticus
8. Genus	
Notophthalmus	Diemictylus
Chiropterotriton	Chiroptertritou
Cryptobranchus	Cryptobrandeus
Desmognathus	Desmoguathus
Gyrinophilus	Gyruinophilus
Lineatriton	Lineatritou
Pseudoeurycea	Pseudocurycea
Pseudotriton	Pseudotritou

Obviously, ignore the upper-lower case distinctions as well as the underlining

6. Family (name)

Plethodontidae ------ Plethdontidae

Cryptobranchidae ------ create this family to accomodate the genus Cryptobranchus which is now incorrectly placed in the Plethodontidae

15. State or province of collection

Michoacan ------ Michsacan

Oaxaca ------ Oxaca

Virginia ------ Viginia

16. County of collection

Kendall ------ Kendall Co.

17. Precise locality of collection

Rincon ------ Rincow

Popocatepetl ------ Popo catepetl

Fortin ------ Fortiu

MT ------ MT.

MT ------ MIT

MI ------ MI.

MI ------ Mile

For item 128626 the two place names Oaxaca and Mexico should be reversed.

Taximetrics Laboratory

9/19/69

Dr. Arnold Kluge
Curator,
Museum of Zoology
University of Michigan
Ann Arbor, Michigan 48104

Dear Arnold:

I know we were slow in getting your BOOKS to you- but please some word of your reaction. We await your evaluation on tanterhooks.

Actually Dr. Nace said you were pleased- what else?

Do you think you will have the resources to put up the rest of the Salamanders? You know that all th entires in those catalogs could be put up as they occure- it would not be necessary to put up only salamanders. If you had a key punch and even a sometimes operatore (even some students) this could be done. It might be slow but it would go up.

If Nace's grant from NIH does come through- your amphibians will go up- but should you bank on that?

Please write and tell all.

It looks, bye the bye that we may survive yet. Although it is too early to be entirely optimistic. The deans and dons here are considering breathing some life into our account.

We are still looking for other places in which we can do business, though.

Please be well and regards to Nelson.

Warmly,

Gil Hersh

file kluge folder

6/4/69 other Save tape

Kluge - Salamander Test Bank

Layout for BOOKs - 421 Items

Book 1. Memo to the reader: The following BOOK is prepared from entries taken from the register of the University of Michigan; Museum of Zoology; Salamander collection; Dr. Arnold Kluge; curator*

Title: Salamander test bank by item number and geography.

Hier: Item #, Genus (8), Species (9), country of collection (14), State or province of collection (15), county of collection (16), precise locality of collection (17).

Book 2. Memo same as Book 1.

Title: Salamander test bank by item number and collector data.

Hier: Item #, Genus (8), Species (9), Collector (10), Day of Collection (11), Month of Collection (12), Year of Collection (13).

Book 3. Memo same as Book 1.

Title: Salamander test bank by Taxonomic organization.

Hier: ^ Family ~~code number~~ (coded) - Family ~~name~~ (named) (6-7), Genus (8), Species (9), Item #, Number of specimens (3).

Book 4. Memo same as Book 1.

Title: Salamander test bank by geographical organization.

Hier: Country of Collection (14), State or Province of Collection (15), County of Collection (16), Precise locality of Collection (17), Genus (8), Species (9), Item #.

6/3/69

Kluge-Salamanders:

Book 1, Title: University of Michigan, Museum of Zoology, Salamander Sample Bank: Sequentially as recorded in museum register and by geographical information.

Hier: Item #, 8, 9, 14, 15, 16, 17.

Book 2, Title: University of Michigan, Museum of Zoology, Salamander Sample Bank: Sequentially as recorded in museum register and by collector's information.

Hier: Item #, 8, 9, 10, 11, 12, 13.

Book 3, Title: University of Michigan, Museum of Zoology, Salamander Sample Bank: Taxonomic Organization.

Hier: (6-7), 8, 9, Item #, #3.

Book 4, Title: University of Michigan, Museum of Zoology, Salamander Sample Bank: Geographical Organization.

Hier: 14, 15, 16, 17, 8, 9, Item #.

THE UNIVERSITY OF MICHIGAN
ANN ARBOR, MICHIGAN, U. S. A. 48104

MUSEUM OF ZOOLOGY

APR 17 1969

15 April 1969

Dr. Gilbert N. Hersh
Taximetrics Laboratory
Armory 101
University of Colorado
Boulder, Colorado 80302

Dear Gil,

In answer to your questions, in order of their asking:

Firstly, we are interested in using the codes only for the order and family names. However, if you wish, for this small operation, they can be included. Secondly; yes, leave the descriptor blank on the counties for Mexico and Costa Rica. These may be filled in eventually with "districts", or some other county equivalent. Thirdly; yes, threat the original collectors number as a book descriptor. Fifthly, please leave the comment section open. The accession number and subspecies are not to be used.

The following indicates my book requests: Book #1 - By increasing item number, then followed by descriptors 8, 9, 14, 15, 16, 17. Book #2 - By increasing item number, then followed by descriptors 8,9, 10, 11, 12, 13. Book #3 - Alphabetically by family; within each family, alphabetically by genus; within each genus, alphabetically by species; within each species by increasing item number; and lastly, for each item number, the number of specimens (descriptor #3). Book #4 - Alphabetically by country of collection; therein alphabetically by state or province; therein alphabetically by county; therein alphabetically by precise locality; therein by genus alphabetically; therein alphabetically by species; therein by increasing item.

Thanks for the help.

Best regards,

Arnold G. Kluge

~~6/3/69~~
4/11/68

University of Michigan
Zoology Museum

A. Kluge, Curator
(Salamanders)

DESCRIPTOR LIST

1. Item number
2. Field number
3. Number of specimens
4. Order (code number) (1)
5. Order (name) (Urodela)
6. Family (code number)
7. Family (name)
8. Genus
9. Species
10. Collector
11. Day of collection
12. Month of collection (name, abbreviated)
13. Year of collection
14. Country of collection
15. State or province of collection
16. County of collection (or other area designation)
17. Precise locality of collection
18. Comments (optional)

Orders

1 Urodela
2 Anura
3 Gymnophiona
4 Chelonia
5 Crocodilia
6 Lacertilia
7 Ophidia
8 Rhyncocephalia

Families

1 Hynobiidae
2 Cryptobranchidae
3 Sirenidae
4 Proteidae
5 Salamandridae
6 Amphiumidae
7 Ambystomatidae
8 Plethodontidae

11 April

Kluge

Dr. Arnold Kluge
Museum of Zoology
University of Michigan
Ann Arbor, Michigan 48104

Dear Arnold:

We have received your salamander catalogs and are beginning work on [illegible] descriptors for input we [illegible] difficulties. First, it is unclear whether you want the code for orders and families and the names or just the code, or just the names. The TAXIR system can easily handle names or codes. I understood you were interested in using codes in your shop. However we are interested in using names as well. For the initial four hundred items we will include both, but I think we should clarify your specific needs. Second, for Mexico and Costa Rica and whatever other countries outside the United States which are listed, no counties of collection are indicated, and we will leave this descriptor balnk. Third, the field number is assumed to be the original collectors number. This is treated as a BOOK descriptor; since it includes more than one state it cannot be treated as an Accessioner descriptor. Again I assume that this was your intention, but if not please let me know.

Fifth, the comment descriptor will be left open for inclusion at a later date. The accession number and subspecies name will not be included. We are enclosing a list of the descriptors being used and there order of entry.

A word about the formation of BOOKS: as you may know, any seven descriptors may be chosen to be printed in a BOOK. These descriptors are then arranged in a hierarchical order. The order specification is completely determined by the user.

You have indicated two BOOKS that you desire - the first according to increasing item number, but you have not specified what other hierarchical listing you may want beneath the item number. Might it be by collector, genus, species, date of collection? Please specify your desire on this. The second BOOK will be by family both alphabetically and a separate BOOK numerically through both genus and species, but the remaining four descripters are at your discretion - you need not use all seven, of course.

What other BOOKS might be of interest? Would one on geographical descriptors be of interest?(country of collection, state or province, county, precise locality, genus, species and item number)? While we are making BOOK together, please specify any other order which you may want.

There is something in the wind about funds for museums in NSF.

Be well, happy and regards from Bob.

Sincerely,

Gilbert N. Hersh

GNH:gm
Enc.

THE UNIVERSITY OF MICHIGAN
ANN ARBOR, MICHIGAN, U. S. A. 48104

MUSEUM OF ZOOLOGY

31 March 1969

Dr. David Rogers
Taximetrics Laboratory
Armory 101
University of Colorado
Boulder, Colorado 80302

Dear Dave,

Here are the salamander enteries (about 300-400) that you requested. I have also included on a separate sheet the list of 15 descriptors that are to be encoded. The item number will be the running catalog number, that which is in the left-most column on the data sheets. I have encircled and numbered each of the 15 descriptors. Descriptor #3 is not given in the catalog but will be entered for salamanders as Urodela. As we decided earlier, this ~~coded but~~ coded by number (in this case 1). Descriptor #4 is also not given in the catalog. Descriptor #4 is the familial name; and I have gone through all of the items included herein and have indicated (by a number code, encircled in red) the correct family. The family names are listed on the separate sheet opposite the appropriate numbers. I believe it will be most efficient to simply use the number designation, rather than the familial name itself. Descriptor #11 is country, but with very few exceptions is not included in our catalog. At least with this simple set of items the keypunch operator should have little trouble sorting the few localities from Mexico. Unfortunately, for these data descriptor #15 will be blank. It should be included owing to the fact that we will eventually have considerable use for it. Note, we have decided not to include the accession number, nor the subspecies name.

Gil Hersh said I should indicate a couple of ways in which books might be printed out. I would suggest the following: (1) according to increasing item number; (2) by family (alphabetically or numerically); therein by genus (alphabetically); and therein by species (alphabetically).

Sincerely yours,

Arnold G. Kluge

18 March 1969

SAME LETTER TO

Dr. Arnold Kluge

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

Dear Dr. Hairston:

Thank you for your hsopitality last week. It was nice seeing the building in which you work, and the mysterious collection of salamanders.

I expect that you are exploring the possibilities of joint funding with Dr. Nace concerning your amphibian collection. So that I may estimate the cost of mounting this collection for TAXIR, please send an estimate of the number of items which would be included in a curatorial bank.

We are prepared to mount the 300 - 400 salamander items photocopied from your ledger. Please make up the order of descriptors to be listed in the various books you wish to have for the salamander collection; also include any specific instructions for entering other descriptors which may be of use. I expect we could have these books ready within a month of the receipt of the ledger photocopies.

Sincerely,

Gilbert N. Hersh
Operations Analyst

GNH:gm

5 March 1969

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

Dear Nelson:

Gil Hersh is on his way up to see George Nace on Tuesday and Wednesday next (March 11 and 12). I hope he has a chance to chat with you and Arnold. Maybe he has some ideas you may want to listen to.

Sincerely,

David J. Rogers
Professor of Biology

DJR:gm

THE UNIVERSITY OF MICHIGAN
ANN ARBOR, MICHIGAN, U. S. A. 48104

MUSEUM OF ZOOLOGY

February 14, 1969

Dr. David J. Rogers
Taximetrics Laboratory
Department of Biology
Armory 101
University of Colorado
Boulder, Colorado 80302

Dear Dave:

Your letter of 11 February makes it clear how tough things really are.

Quite frankly, our situation is very similar, and for any time in the next few years I see no improvement.

We have discussed the problem here, and feel that the project will have to be shelved until we can see enough support to complete the salamander collection at least. I do not believe that the Program on Systematic Biology either can or will fund the work.

Thus, while we are always happy to see you, I don't think that there is much that can be done any time soon, and advise against a business trip.

Yours sincerely,

Nelson G. Hairston
Director

NGH/dbh

Dr Klein -

Gl Hrs 1 n i wa up / a

Geo Nace n Tue & Wed ncl. (11 & 12)

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me w — l lth l

Sinc

11 February 1969

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

Dear Nelson:

I deliberately delayed answering your letter of February 3, with enclosed statement of expenses, until I had an opportunity to discuss in Washington the prospects of a continuation grant to support our activities. I talked specifically with people in the Office of Scientific Information Service, and specifically about support for our team as a research and development group. Frankly, I was shot down. After I had had some rather vague encouragement from one member of OSIS just prior to my visit with you last December, I felt that they were indeed willing to continue our grant. It was that vague assurance that encouraged me to say to you that we would take some of our computing funds to allow you to get on with mounting of your data bank on the "herps".

Last Friday, I went in with a draft of a proposal to continue our work, and then the "fit hit the Shan." OSIS is not willing to fund us to help you, or any other of our collaborators, in mounting TAXIR data banks. What they want, apparently, is for the whole biological community to commit itself to one or another system, and all agree to use it. And somehow, they want me to sell "the community" on our system, and then have "the community" come in and say - "we have agreed that TAXIR is the system we all will use." When I pointed out the enormity of the task to get the community to accept somethin - anything - they pointed out that it was not their task to support the community with something it doesn't want. When I said something about demonstrating the value of this system, they replied that they have supported demonstrations of several systems for the past ten years, and from their viewpoint, none of these demonstrations had made a dent in the biological community's ways of doing things. Their arguments were completely valid, and all I could do was admit the correctness of their position, even though I and my team are left high and dry, with no direct way of continuing our efforts.

Not the least of our problem, of course, is the fact that we are not recognized, officially, as a team by anybody, not even our own University. We have lived hand-to-mouth on various grants first from one granting agency and then another. I know that this true for many groups across the country, and all those that have bit the dust because of the recent budget squeeze in Washington will say to me is "welcome to the group."

This so far is not to say that we must cut you off now, and not fulfill the agreement we made. What I intend to say is that somehow, somewhere, we must find ways to support your efforts, and ours, through a different channel. There probably is such a channel, and we must explore it together. Clearly, you want a demonstration of some system - any system- that will help out the curators of large collections. Probably more than just a demonstration - an actual working system for your group. And probably, there must be outside funding during the preliminary stages, and again probably there must be an appeal to the only Washington agency generally receptive to these ideas, NSF. But this time, not to OSIS, but to the section of biology which is most specifically dedicated to biological curatorial activity, the systematics panel. I suggest, therefore, that we make a joint proposal, with you as principal investigator and me as co-principal (or perhaps in some other category) in which we decide how much funding is needed. We have already established how much it will cost for the actual operation, but we (for our continuation) must have some funds which are for technical advice, specifically written in to your budget. I haven't hit upon a precise amount that we can justify on such a proposal, but that isn't as important right now as it is to find out your reaction.

I am just now reminded of something which might, eventually, have some merit. I recall that you are a member of a very select group, the Directors of Natural History Museums, or some similar title. Could not that group choose up sides and say to OSIS that they represent a large segment of the Biological Community, and they (the Museums) are as interested in information retrieval systems as, say, the chemical community, and that since OSIS has a whole section devoted to chemical information retrieval, that the Biologists are equally in need of some section representing biology? Such a statement might go a long way to convincing OSIS that there is a community of biologists willing to stick together long enough to work out the most efficient system for museums. It might also be a part of such a statement that there is a group whose efforts in this direction exists in the University of Colorado, and that this group could serve the larger community, given that the larger community wanted it.

I feel that we need to visit you some time soon to set up the on-going project, and to work out some sort of grant instrument. I propose that we meet you some time in the next few weeks, so that Gil Hersh can aid in the establishment of the work program for the herpetological bank, and set up his time-and-motion studies. You and I can talk about the possible funding routes, if you are amenable to such considerations. I also want to get together with George Nace to see what we can do for his "frog farm" data bank.

In the meantime, we would like to ask you to amend your statement of programming costs, asking for funds on a need basis, rather than in a lump sum. I know that we put it the other way, but with the circumstances as they are, if you can send us the bill on a month-by-month basis, this will help us along. Hope this is satisfactory.

Let me know about possible meeting dates from now through, say, the first week in March. I can't make it from February 20 - 24, but might make it on Wednesday-Thursday, February 26-27 or Tuesday-Wednesday, March 4-5. Check these days as possible, at least from my end.

Sincerely,

David J. Rogers
Professor of Biology

DJR:gm

THE UNIVERSITY OF MICHIGAN
ANN ARBOR, MICHIGAN, U. S. A. 48104

MUSEUM OF ZOOLOGY

February 3, 1969

Dr. David J. Rogers
Taximetrics Laboratory
Department of Biology
Armory 101
University of Colorado
Boulder, Colorado 80302

Dear Dave:

As we agreed in conversation when you were here, I enclose our statement for programming.

The keypunch has been delivered and we seem to be ready to go on the salamanders.

Best regards to all.

Yours sincerely,

Nelson G. Hairston
Director

NGH/dbh
Encl.

THE UNIVERSITY OF MICHIGAN
ANN ARBOR, MICHIGAN, U. S. A. 48104

MUSEUM OF ZOOLOGY

February 3, 1969

Account No. 34485
Museum of Zoology Research

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

Computer Programming $3000.00

Nelson G. Hairston
Director

20 January 1969

Dr. Arnold Kluge
Museum of Zoology
University of Michigan
Ann Arbor, Mich. 48104

Dear Arnold:

I have seen the "page" from your catalogue and perhaps the following example taken from that page will enrich the more general description enclosed. (Find the document, "TAXIR Define Item Statement".)

Suppose the following descriptors were established for your data bank.

Item Identification Number	=	Catalog No.
Descriptor 1	=	Number of specimen
D 2	=	Genus
3	=	Species
4	=	Subspecies
5	=	Collector
6	=	Day of Collection
7	=	Month of Collection
8	=	Year of Collection
9	=	State of Collection
10	=	County of Collection
Comments 1	=	Precise Locality
2	=	Remarks

Realize that this descriptor is by way of example.

Some Define Item Statements would look like:

Define items 128741, 1, Dosmognathus, Wrighti, -, S. G. Tilley, 17,-August, 1967, North Carolina, Macon, Standing Indian Wldlf Mgmt., *

128742, 1, Dosmognathus, aeneus, -, S.G. & M.L. Tilley, 11, July, 1967, Georgia, Rabun, Warnoman Dell Rec Area, attitude 1920 *

128747, 1, Pseudotriton, ruber, Schenck; S. & M. Tilley & Fitzpatrick, 9, July, 1965, North Carolina, Macon, Highlands near bio. station, A.O.R. *

1. If no subspecies is given it might be that the subspecies is unknown, or does not exist. If this is left blank, "Unknown" will appear in the Book. If a subspecies does not exist this would be misleading. If a "-" is entered in the Define Item Statement,,then "-" will appear in the book.

2. You may wish to adopt the convention "Tilley S.G." etc. so that collectors' names will be entered alphabetically on last names. Remember that commas are to be used only to separate character state names and may not be part of a state name. The symbols "&" or "^" or "+" etc. may appear, but if you ever wish to use the TAXIR Accessioner with this bank, the isolated word "AND" may not be used in a state name.

3. Commas are used only as state separators.

4. If information is missing, merely leave blank the place where it would go: the commas or asterisk, however, remain.

I hope this is of some help.

Very truly yours,

George F. Estabrook

GFE:gm

Cat. No.	Access No. 1968-69	Orig. No.	No. of Spec.	Name	Collector	Date Collected
128741	#1	KL7493	1	Desmognathus wrighti	S.G. Tilley	17 August 1967
128742	"	KL1594	1	Desmognathus aeneus	S.G.&M.L. Tilley	11 July 1967
128743	"	1595	1	" "	" " "	"
128744	"	KL2085	1	" "	" " "	23 July 1967
128745	"	KL7015	1	Pseudotriton ruber schencki	" " "	1-5 August 1968
128746	"	KL7016	1	" " "	" " "	"
128747	"	IJ8996	1	" " "	S.&M.Tilley, Fitzpatrick	9 July 1968
128748	"	IJ8997	1	" " "	" "	"
128749	"	IJ8998	1	" " "	" "	"
128750	"	IJ8999	1	" " "	" "	"
128751	"	IJ9000	1	" " "	" "	"
128752	"	IJ9584	1	" " "	S.G.&M.L. Tilley	June, 1967
128753	"	IJ9585	1	" " "	" " "	"
128754	"	IJ8970	1	" " "	S.&M. Tilley, Fitzpatrick	29 June 1968
128755	"	IJ9598	1	" " "	S.G.&M.L. Tilley	12 July 1967
128756	"	KL2184	1	" " "	" " "	8 July 1967
128757	"	KL2183	1	" " "	" " "	9 July 1967
128758	"	KL1746	1	" " "	S.G. Tilley	28 June 1967
128759	"	KL6380	1	Pseudotriton ruber nitidus	S.G. & M.L. Tilley	14 July 1968
128760	"	KL6381	1	" " "	" " "	"
128761	"	KL6382	1	" " "	" " "	"
128762	"	KL6383	1	" " "	" " "	"
128763	"	KL7316	1	" " "	" " "	20 August 1968
128764	"	IJ8945	1	" " "	S.G. Tilley	30 March 1968
128765	"	IJ8948	1	" " "	"	"
128766	"	IJ8949	1	" " "	"	"
128767	"	IJ8950	1	" " "	"	"
128768	"	IJ8957	1	" " "	"	"
128769	"	IJ8989-95	7	Plethodon welleri ventromac.	S.Tilley, Fitzpatrick	2 July 1968
128770	"	KL6384	1	Plethodon cinereus	Tilley, Bruce, Harrison	13 July 1968
128771	"	KL2185-8	4	Aneides aeneus	S.G. Tilley	5 July 1967
128772	"	----	4	Plethodon yonahlossee	SG.&M.L.Tilley, Ferguson	30 May 1968
128773	"	IJ8969	1	" "	" " Fitzpatrick	1 July 1968
128774	"	IJ8872	1	" "	S. Tilley, H. Wilbur	25 April 1967
128775	"	8874	1	" "	S. Tilley	13 May 1967
128776	"	NEH6385-6403	20	Plethodon jordani x glutinosus	Tilley, Fitzpatrick, Bruce, Harrison	13 July 1968
128777	"	6076-80	6	" " "	" " "	"
128778	"	KL2081-4	4	Plethodon jordani shermani	S.G. & M.L. Tilley	23 July 1967
128779	"	2107	1	" " "	" "	24 July 1967
128780	"	2182	1	" " "	" "	9 July 1968

Locality Data	Remarks
North Carolina: Macon Co., Standing Indian Wldlf. Mgmt. Area, 1.5 mi N of Deep Gap, 4250'	
Georgia: Rabun Co., Warwoman Dell Rec. Area, ca. 1920'	♀ with brood
" " " " "	
North Carolina: Macon Co., Standing Indian Wldlf. Mgmt. Area, 1.5 mi N of Deep Gap, 4250'	found with brood
" Macon Co., Highlands, vid. of bio. station	A.O.R.
" " .6 mi S Highlands on Bullpen Road, 3800'	"
" " nr. Highlands, 6.6 mi N U.S. rt. 64 on Buck Creek Rd.	"
" " nr. Highlands, 2.7 mi N U.S. rt 64 on Buck Creek Rd.	"
" " Flat Mountain Rd.	"
" " "	"
" " "	"
" " vic. of Highlands	"
" " "	"
" " " , trail to Highlands falls, 3720'	by trail in small stream
" " 4 mi NW of Highlands on U.S. rt. 64	A.O.R.
" " nr. Highlands, ca. 3 mi NNW of U.S. rt. 64 on Buck Creek Rd.	"
" " Franklin-Nantahala Gorge Rd., 10 mi NW of Franklin	"
" " Cliffside Lake, along trail from parking lot	in seepage area
" Yancey Co: Mt. Michell WLDlf. Mgmt. Area, S. toe R. Rd. near Busick	A.O.R.
" " Mt. Mitchell Wldlf. Mgmt. Area, S. Toe R. Rd. near Busick	"
" " st.rt. 80 between Buck Cr. Gap & S. Toe River Rd.	"
" " st. rt. 80 between Buck Cr. Gap & S. Toe River Rd.	"
" " road on W side of S. Toe River, near Busick	"
" McDowell Co., st.rt. 80 7.7 mi S Buck Creek Gap	D.O.R.
" " " 4.7 " "	A.O.R.
" " " 5.2 " "	"
" " " 6.5 " "	"
" " " 4.7 " "	"
Tennessee: Unicoi Co., Unaka Mtn. Scenic Area Trail below picnic acrea, 4500'	
North Carolina: Macon-Clay Cos., Tuni Gap E of Tusquitee Bald	
" Macon Co., near Highlands, "Granite City"	
" Buncombe Co., Dillingham-Blue Ridge Pkwy. Rd., 4.2 mi NW parkway	wet rockface
" McDowell Co., along Blue Ridge Pkwy. 3.5 mi N Black Mtn. Gap, 4225'	" "
" Avery Co., along U.S. 221 NW of Linville	
" Yancey Co., Mt. Mitchell Wldlf. Mgmt. Area, S. Toe R. Rdat Hemphill Cr.	
" Macon-Clay Cos., Tuni Gap E of Tusquitee Bald	
" Clay Co., Fires Cr. Wldlf. Mgmt. Area, rd. to Big Stamp at Cold Spring Cr.	
" Macon Co., Standing Indian Wildlf. Mgmt Area	
" " " "	
" " Wayah Bald Rd. 1.7 mi N Wayah Gap, 4750'	

This is one page of our main
catalogue ---an approximate
transcription

analysis of cost approx made
1/13/08- see Dan's letter
of that date
Kluge Heike

THE UNIVERSITY OF MICHIGAN
ANN ARBOR, MICHIGAN, U. S. A. 48104

MUSEUM OF ZOOLOGY

November 18, 1968

Dr. David J. Rogers
Taximetrics Laboratory
Department of Biology
Armory 101
University of Colorado
Boulder, Colorado 80302

Dear Dave:

We will be delighted to see you on December 17th, and have tentatively arranged for you to give a seminar at 4:00 p.m. Herb Wagner and I have agreed to provide an honorarium.

As I wrote Mr. Hersh, I am not sanguine about early initiation of an automatic data processing system, because of the financial situation, both on personnel and equipment.

Best regards.

Yours sincerely,

Nelson G. Hairston
Director

NGH/dbh

2 December 1968

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

Dear Nelson:

I plan to arrive at the Detroit airport on Monday, December 16, at 6:44 PM (Northwest 363 from Pittsburgh) and take some sort of limousine to Ann Arbor. Would you be kind enough to reserve a room for me on Monday and Tuesday nights? I will leave Detroit Wednesday at 11:25 AM.

Gil Hersh has made observations (attached) about your information retrieval bank based on the copy of the ledger sheet which Arnold Kluge was kind enough to send.

Looking forward to seeing you,

Sincerely,

David J. Rogers
Professor of Biology

DJR:gm

P.S.: A title for the seminar might be: An Information Retrieval System for Biology.

I. Assumptions we have made about your data

If 1) the page from the main catalog sent to us by Dr. Kluge is representative of the average page in the catalog; and 2) all information to be entered in the TAXIR system is contained on the pages of the main catalog (no reference has to be made to other books, cards, files, etc.) then the following analysis holds.

II. Steps needed for preparation of a "clean" bank.

Step 1. Recording data in machine readable form. A standard key punch (IBM 026) can be used. Figures given here are based on this machine. However, we are investigating the possibility of using other machines which should be much faster and more efficient than the key punch. (Manufacturer claims as much as 40% more efficient.)

Keypunching can be done either "in shop" by leasing an input device and hiring the personnel needed to operate it; or, can be done "out of shop" at some service center specializing in key punching (e.g., Univ. of Michigan Computing Center).

Costs of each will be discussed later.

Under either in-shop or out-of-shop condition:

The average item (specimen entry in the main catalog) will have 240 columns to be punched (or 3 file records of 80 characters each).

A fair to good operator should be able to punch at the rate of 120 columns per minute, and should easily be able to prepare this data in two minutes per item.

Thus for initial punching, considering 20,000 items x 2 minutes per item = 40,000 minutes.

Step 2. This raw punched data must be verified and corrected. This step consists of three parts: (1) a machine scan, (2) a "human" scan, and (3) correction technique.

1. To machine scan these data, about 60 minutes of central processing unit and about 120 minutes of peripheral processing unit will be needed on the IBM 360 (or the CDC 6400). This estimate may be high.

2. Approximately 0.3 minutes per item over the data bank will be needed for "human" scan, or 0.25 minutes x 20,000 items = 5000 minutes.

3. Approximately 0.3 minutes per item over the entire data bank will be needed for mistake correction, or 6000 minutes.

The verification scan will have to be in-house, but the corrections could be returned to a service center.

Thus for parts (1) and (2) of step 2 approximately 52,000 man-minutes, or 870 man-hours, are needed.

III. Cost estimates for "out-of-shop" versus "in-shop" work.

A. "Out-of-shop"

If the whole job is contracted out-of-shop, about 770 man hours will be needed to punch the data and corrections. Usually a service center will charge $4.00 per hour for this type of work including the cost of the cards used. Thus the punching and correction job could be done for - - - - $3,030.00

Add to this figure 100 hours in shop needed to scan and note mistakes, or approximately three weeks, assume $100 per week - - - - - - - 300.00

Total approximately $3,400.00

B. "In-shop"

If in-shop, minimally one input device would be needed and one full time operator.

The cost of the input device (IBM 026 punch) is $60/month less 10% University discount for a minimum 6 month contract, or — — — — — — $324.00

A full time operator on a 40 hour week at approximately $100-$200 per week for 20 weeks, which would also include correcting scan.

Note that only 35 productive hours can be expected per week!

Total, including cost of cards, about $2,200.00

In shop TOTALS, approx $2,600.00

IV. Machine time might cost about $450

V. Total operational costs, minimum scale

In house $3,050.00

Out of shop $3,850.00

It should be noted that in addition, Dr. Kluge or an adequately trained assistant should spend an average of 100 hours in supervision, especially during the data verification sub-program. We have not included this as a cost.

VI. It should also be noted that if it is the desire of Drs Kluge and Hairston to prepare the data faster, they must put on additional personnel until the input device is working minimally 12 hours a day,

This would not increase total costs by more than 5%, for work will be completed in a shorter time.

Costs will increase by about 20% if an additional device is leased with a full time operator to put up the data ~~quicker~~ faster.

In other other words by doubling the number of devices and man hours, production will go up by about 85% and total project costs will go up by about 20%.

VII. If there are differences from the initial assumptions, costs will increase. The amount of increase can only be assessed by an inspection of the materials and a review of resources.

In Summary. The project of preparing clean data for input to TAXIR should cost from $3,000 to $3,900 using an IBM key punch, and with assumptions 1 and 2 holding, the data could be prepared in 20 - 26 weeks under minimum conditions specified.

THE UNIVERSITY OF MICHIGAN
ANN ARBOR, MICHIGAN, U. S. A. 48104

MUSEUM OF ZOOLOGY

November 15, 1968

Mr. Gilbert N. Hersh
Taximetrics Laboratory
Department of Biology
Armory 101
University of Colorado
Boulder, Colorado 80302

Dear Mr. Hersh:

Since Dr. Kluge will be away at meetings between Christmas and New Year's, the best time for you to visit us would be during the week starting January 5.

I must admit, however, that there appear to be a number of stumbling blocks to any early initiation of an automatic data processing system here. Most important of these are the tight financial situation for acquiring equipment and personnel, and the problems associated with using a system which is not compatible with the university's computer.

Yours sincerely,

Nelson G. Hairston
Director

NGH/dbh

14 November 1968

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

Dear Nelson:

I am planning a trip which will put me in Ann Arbor December 17 to go over with you the problems of getting up the herpetology data bank. Is there any chance that on that day some sort of a seminar could be presented to some group there? If so, I will be glad to "yak" for an hour. You might ask Herb Wagner if he wants to participate in this. He might even be able to reciprocate the honorarium we gave him for coming here.

More data on time of arrival, etc. later.

Sincerely,

David J. Rogers
Professor of Biology

DJR:gm

6 November 1968

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

Dear Dr. Hairston:

I met Arnold Kluge last night at the Numerical Taxonomy meeting and I asked that he send us a photocopy of a few pages of his salamander catalog. From these I think we can determine average times for transcribing an average item.

I would like to come to the University of Michigan at Ann Arbor sometime at the end of December or in early January. Could you suggest a date at which time we could meet to review your operation and take a look at Dr. Kluge's entire collection? I think we can probably begin working on the collection shortly thereafter.

Sincerely,

Gilbert N. Hersh
Economics Analyst

GNH:gm
CC: Arnold Kluge

9 May 1968

Dr. Nelson G. Hairston
Museum of Zoology
University of Michigan
Ann Arbor, Michigan 48108

Dear Nelson:

We've just had a post-mortem on your visit, and thought you might like to hear some of the ideas generated therein.

Most of what we have to say deals with efficiency of operations, both immediate and future. When operations stop being "immediate" and when "future" begins is a moot question.

Since it seemed that we concluded that the publication of a book of the museum collections in one section of one of your divisions would be the first use of IR, you would not be using the main frame (or central processing unit) of the computer very frequently. Perhaps on the average, once or twice a year, for perhaps an hour's run, would cover the requirements of computer time, in this initial phase. With these propositions in mind, we recommend the following procedures.

1. The cheapest, and at this time, most efficient method of transferring data to machine-readable form would be key-punch and verifier. This would not, of course, produce the labels you want, and which you could get with a tape-producing typewriter, or from the remote computer connection, but would be best in the long haul of recording your back-log of input information.

2. Do not bother at this stage of the game to reprogram our program for your computer since this is an expensive step at this time, and for one or two hour runss on the hardware once or twice a year, it would be much cheaper to ship us the input data, recorded on tape, to be processed here. We will send you back tapes ready for printing.

3. After the trial runs have been made, you can then "advertise" the product to generate interest in other museums.

4. When interest from other museums increases, we could then get a programmer on your staff to work with us in the reprogramming our programs for your IBM 360, and thereby shift the programs to your own inhouse operation. This would be beneficial in that we would have the programs running on the two major machines in the country, CDC and IBM. Between the two, there should be very few places in the country that could not pick up the programs without further reprogramming.

Note that we have so-far excluded the problem you have in converting from the quill pen-ledger system for label making and initial entry. Our target has been the problem of catching up with the back-log of a segment of the museum's records, but we feel that use of the key punch as input device can easily be set up to produce current records, labels, etc., with little extra effort. You can run the key-punched cards through a format-printing program which can easily generate the labels needed, in any desired form. Since you must have requirements for different types of labels - for dried specimens, for pickled material in jars or plastic bags, we don't feel that we can serve as advisors on such problems. Given the need for paper labels, you can use the key-punch, using the types of programs mentioned above.

We more-or-less discounted the value of the paper tape typewriter for reasons of economy, but also because you have to have a paper tape to machine reader, and a program to tell the hardware how to read the data. Again, however, you will have to decide in collaboration with your curators, which route to go.

Your remote console should continue to serve the purposes for which you have already used it. We don't think you should consider that device for the great back-log of data to be put into machine-readable form for the IR book. It is much too expensive for that purpose, and it cannot serve as an off-line book printer.

I hope these comments will help in your design of the IR system. We enjoyed having you with us.

Sincerely,

David J. Rogers
Professor of Biology

DJR:gm

THE UNIVERSITY OF MICHIGAN
ANN ARBOR, MICHIGAN, U. S. A. 48104

MUSEUM OF ZOOLOGY

May 9, 1968

Dr. David J. Rogers
Taximetrics Laboratory
Department of Biology
University of Colorado
Boulder, Colorado 80302

Dear Dave:

I want to thank you all for a very informative and enjoyable visit. I have a much clearer mental picture of what can and should be done now, and have been exploring the situation here. As I expected, the herpetologists are interested in getting started on a feasibility study, probably using salamanders or turtles, the collections of both of which are of the right size and complexity to serve as good models for expanding the work in the future.

They also had some interesting ideas about the system. For example, although a "display" program might be too expensive for the whole collection, it might be entirely feasible for the material acquired during the intervals between updatings. Since the annual growth of the entire herpetological collection is around 3000 specimens, the maximum number of items involved for turtles or salamanders would probably be numbered in the hundreds.

Incidentally, several curators have expressed an interest in a book of types, of which we have a total of around 2150. This could easily be included as part of the initial grant.

It also occurred to us that a useful description would be "Additional Information," with a code to what kind of information was available.

We are prepared to go ahead with the grant application, but I will need at least order of magnitude estimates of the cost of various items, for example, the cost of adapting your program to the IBM 360, the number of trips between Ann Arbor and Boulder that might be involved, total estimated computer time, and other items that I may have forgotten.

Many thanks again.

Yours sincerely,

Nelson G. Hairston
Director

NGH/dbh

9 May 1968

Dr. Nelson G. Hairston
Museum of Zoology
University of Michigan
Ann Arbor, Michigan 48108

Dear Nelson:

We've just held a post-mortem on your visit, and thought you might like to hear some of the ideas generated therein.

Most of what we have to say deals with efficiency of operations, both immediate and future. When operations stop being "immediate" and when "future" begins is a moot question.

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1. The cheapest, and at this time, most efficient method of transferring data to machine-readable form would be key-punch and verifier. This would not, of course, produce the labels you want, and which you could get with a tape-producing typewriter, or from the remote computer connection, but would be best in the long haul of recording your back-log of input information.

2. Do not bother at this stage of the game to reprogram our program for your computer since this is an expensive step at this time. and for one or two hour runs on the hardware once or twice a year, it would be much cheaper to ship us the input data, recorded on tape, to be processed here. We will send you back tapes ready for printing.

3. After the trial runs have been made, you can then "advertise" the product to generate interest in other museums.

4. When interest from other museums increases, we could then get a programmer on your staff to work with us in the reprogramming our programs for your IBM 360, and thereby shift the programs to your own inhouse operation. This would be beneficial in that we would have the programs running on the two major machines in the country, CDC and IBM. Between the two, there should be very few places in the country that could not pick up the programs without further reprogramming.

Note that we have so-far excluded the problem you have in converting from the quill pen-ledger system for label making and initial entry. Our target has been the problem of catching up with the back-log of a segment of the museum's records, but we feel that use of the key punch as input device can easily be set up to produce current records, labels, etc., with little extra effort. You can run the key-punched cards through a format-printing program which can easily generate the labels needed, in any desired form. Since you must have requirements for different types of labels - for dried specimens, for pickled material in jars or plastic bags, we don't feel that we can serve as advisors on such problems. Given the need for paper labels, you can use the key-punch, using the types of programs mentioned above.

We more-or-less discounted the value of the paper tape typewriter for reasons of economy, but also because you have to have a paper tape to machine reader, and a program to tell the hardware how to read the data. Again, however, you will have to decide in collaboration with your curators, which route to go.

Your remote console should continue to serve the purposes for which you have already used it. We don't think you should consider that device for the great back-log of data to be put into machine-readable form for the IR book. It is much too expensive for that purpose, and it cannot serve as an off-line book printer.

I hope these comments will help in your design of the IR system. We enjoyed having you with us.

Sincerely,

David J. Rogers
Professor of Biology

DJR:gm

29 April 1968

Dr. Nelson G. Hairston
Museum of Zoology
University of Michigan
Ann Arbor, Michigan 48108

Dear Dr. Hairston:

The enclosed map will get you out ϕϕ Denver. Coming into Boulder, stay on the Turnpike until you see on the right hand side the big sign for the Holiday Inn (where we have reserved a room for you). You will have to make a U-turn to the rightoon to the service road which parallels the freeway to get back to the Inn. It is avery simply, easy arrangement, however.

My home phone number is 447-1819. Give me a call when you get in, if you care to. We might have a chance for a chat on Sunday evening. I look forward to seeing you.

Sincerely,

David J. Rogers
Professor of Biology

DJR:gm

THE UNIVERSITY OF MICHIGAN
ANN ARBOR, MICHIGAN, U. S. A. 48104

MUSEUM OF ZOOLOGY

April 23, 1968

Dr. David J. Rogers
Taximetrics Laboratory
Department of Biology
Armory 101
University of Colorado
Boulder, Colorado 80302

Dear Dr. Rogers:

I plan to arrive in Boulder sometime during the late afternoon of Sunday, May 5, and leave Denver at 5:30 p.m. on the 7th. Would you please reserve a room for me for the nights of the 5th and 6th? I'll be renting a car in Denver, so location in Boulder shouldn't make much difference. Please let me know where the room is, so that I will know where to go.

I look forward to seeing you all again.

Yours sincerely,

Nelson G. Hairston
Director

NGH/dbh

THE UNIVERSITY OF MICHIGAN
ANN ARBOR, MICHIGAN, U. S. A. 48104

MUSEUM OF ZOOLOGY

February 28, 1968

Dr. David J. Rogers
Department of Biology
Armory 101
University of Colorado
Boulder, Colorado 80302

Dear Dr. Rogers:

Thank you very much for your invitation to visit Boulder and to learn about your information retrieval system, and to find out whether it is feasible for the Museum of Zoology to try such an arrangement.

My only commitments for May are for the week of May 13th; the weeks of the 6th, 20th, and 27th are all open, and I have no preference about which part of the week. Please let me know what suits you best.

Yours sincerely,

Nelson G. Hairston
Director

NGH/dbh

Week of 6th
6 + 7

4 March 1968

Dr. Nelson G. Hairston
Museum of Zoölogy
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

THE UNIVERSITY OF MICHIGAN
ANN ARBOR, MICHIGAN, U. S. A. 48104

MUSEUM OF ZOOLOGY

February 19, 1968

Mr. R. C. Brill
Taximetrics Laboratory
Department of Biology
Armory 101
University of Colorado
Boulder, Colorado 80302

Dear Mr. Brill:

Thank you for your letter of 5 February, suggesting that we get together on the problem of information storage and retrieval for museums.

My problem is the same as that of any director of a research collection, I suppose. Essentially, I would like to save the time of the curators. In round numbers, the collections total nearly 6 1/4 million specimens, as follows:

Fish	2,400,000
Insects	2,250,000
Mollusks	1,160,000 200,000 lots
Reptiles & Amphibians	188,000
Birds	160,000
Mammals	75,000

Cataloging is not uniform among the divisions. For example, the Insect Division does not catalog specimens at all, relying on the collection to be its own catalog. Other divisions have elaborate catalogs, with at least a cross-catalog between species and geographic location. As might be expected, the amount of information available varies greatly among specimens in the same collection. Some carry fairly detailed ecological data; a few lack even a location. At a minimum, we would like to store and retrieve the following: accession number, hierarchy (say Order, Family, Genus and species), location, at least including altitude or depth, and date of collection. Other information that we might wish recorded could be habitat (conifer forest, shortgrass prairie, stream riffle), time of day,

whether active or not, weather conditions, how collected, name of collector, and name of identifier. The list, as you can well imagine, could probably go on and on, and one severe problem will be when it should be terminated.

One impression that I gained from the Mexico City meetings was that it will not be either feasible or desirable to enter taxonomic characters in any routine system that may be adopted.

The University of Michigan has just replaced its old computer with the IBM 360/67. A time-share terminal will be located in the Museums building, and it is at least conceivable that computer time would be made available routinely for searching catalogs, should the information be stored electronically.

At present I am not even sure that a sophisticated system is worth the time and money that it would cost. Probably the worst difficulty with any system (and I am convinced that we should at least get out of the early 19th century with our methods) is the problem of entering data already in the catalogs. No matter what is adopted, this is going to mean a very large investment in time, which is what I want to save in the first place.

Right now, my numerous commitments will prevent me from leaving Ann Arbor for more than a day or two, but I should like very much to take you and Dr. Rogers up on your invitation. What do you estimate as a reasonable amount of time for me to spend in Boulder? If I had that answer, I could estimate when I could come.

With my best regards.

Yours sincerely,

Nelson G. Hairston
Director

NGH/dbh

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

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. Bell

RCB:gm
CC. D. J. Rogers