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4909 Frew Street
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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.

Morphological Studies in *Vararia* °

A. L. WELDEN, *Tulane University*

An analysis of the American species of the basidiomycetous genus *Vararia* shows the genus to consist of two well-defined groups of species. The first group, represented by *Vararia effuscata* (Cke. & Ellis) Rogs. & Jacks., *V. granulosa* (Pers. ex Fr.) Laurila, *V. pallescens* (Schw.) Rogs. & Jacks., and *V. pentophoroides* (Burt) Rogs. & Jacks., produce globose or subglobose spores which have a double or thick wall and a warted or spinulose amyloid exosporium. All, except *V. pallescens*, possess pseudocystidia; two of these species, *V. effuscata* and *V. granulosa*, have the macrocystidial subtype of pseudocystidium. The other group, represented by *V. gallica* (Bourd. & Galz.) Menzies, *V. investiens* (Schw.) Karst. (the generic type), *V. pectinata* (Burt) Rogs. & Jacks., *V. phyllophila* (Masse) Rogs. & Jacks., and *V. racemosa* (Burt) Rogs. & Jacks., produce cylindrical or subcylindrical spores which have a single or thin, smooth, nonamyloid wall. All species of this group, except *V. gallica*, produce pseudocystidia, none of which are of the macrocystidial subtype.

° Supported by the National Science Foundation, G-12336.

Abstract reprinted from the *ASB Bulletin*,
Vol. 11, No. 2, p. 58, April 1964.

Prof. B. Lowry

Dear Bernie,

The fungi you sent
look fascinating. Thank you.
Are they to be returned to
you or filed in the Tulane
Herbarium?

Hope your work goes
better than mine, which is
at a snail's pace.

Cordially,
Arthur

PROPOSAL NO. BSR-8307573	INSTITUTION N Y BOTANICAL GARDEN	PLEASE RETURN BY 1
PRINCIPAL INVESTIGATOR DUMONT KENT P		NSF PROGRAM SYSTEMATIC BIOLOGY PROGRAM

TITLE
MONOGRAPHIC STUDIES IN THE SCLEROTINIACEAE AND RELATED DISCOMYCETES

COMMENTS (QUALITY OF THE PROPOSED RESEARCH, RECENT RESEARCH ACHIEVEMENTS OF THE PRINCIPAL INVESTIGATOR(S), ETC.)
CONTINUE ON ADDITIONAL SHEET(S) AS NECESSARY.

The outline of the proposed systematic, monographic studies on this taxonomically complex group of ascomycetous fungi is ambitious but feasible. I have carefully examined Dr. Dumont's proposal and his plans for approaching the various anticipated problems to be solved, or at least to be partly disentangled, reassessed and taxonomically rearranged, and find that his concepts are sufficiently ample, realistic and viable to enable him to make significant progress within the time framework he envisions. Fortunately, Dr. Dumont has had long and successful experience working with these fungi, and in my judgment he is superbly qualified to engage in this research. Based upon his previous research efforts with these and related fungus groups, his extensive field and laboratory experience, and in view of his numerous published contributions on the Sclerotiniaceae and their allies, which have already considerably advanced our knowledge in this area, there is every reason to expect still further clarification of the taxonomic position of these fungi resulting from this project. It should be noted that Dr. Dumont has not fallen into the error of attempting too much, and has wisely chosen to defer cultural and electron micrograph studies which at this time would almost surely be counterproductive. The budgetary estimates, while seemingly large, are in my opinion not excessive, and appear to be fully justified by Dr. Dumont's careful review of needs over a 3-year period.

I strongly and unqualifiedly support Dr. Dumont's proposal.

OVERALL RATING: EXCELLENT VERY GOOD GOOD FAIR POOR

Verbatim but anonymous copies of reviews will be sent only to the principal investigator/project director. Subject to this NSF policy and applicable laws, including the Freedom of Information Act, 5 USC 552 and formal requests from Chairpersons of Congressional committees having responsibility for NSF, reviewers' comments will be given maximum protection from disclosure.

REVIEWER'S SIGNATURE <i>Bernard Lowy</i>	REVIEWER'S NAME (TYPED) Bernard Lowy
OTHER SUGGESTED REVIEWERS (OPTIONAL)	<i>5-III-1983</i>

REVIEWER'S COPY

NATIONAL SCIENCE FOUNDATION
WASHINGTON, D C 20550

DR. BERNARD LOWY
DEPT OF BOTANY
LOUISIANA STATE UNIV
BATON ROUGE, LA 70803

FEB 4 1983

Ref: Dumont

The quality of the National Science Foundation's awards for research projects depends greatly on the critical judgments of expert reviewers. We hope you will help us to evaluate the research proposed in the enclosed material. Even if your speciality is not identical with that of the applicant, we would like to receive your review because general comments often provide a valuable perspective.

All comments that you care to make are welcome. However, we are especially interested in your (1) evaluation of the scientific quality and importance of the proposed research and (2) assessment of the capability of the applicant to make original and creative contributions to the scientific area represented by the proposed research. In responding to (1) special attention should be given to the significance of research objectives, feasibility of the experimental design, rigor of the hypotheses, and adequacy of data analysis. With respect to (2) recent accomplishments of the applicant, familiarity with related work, training, and institutional facilities should be taken into account. Although budgetary aspects should not influence your overall appraisal of the proposed project, budgetary comments will be useful.

"Information for Reviewers of Proposal" (NSF Form 1A, printed on the reverse side of this letter) explains general evaluation criteria, provides guidance for avoiding conflicts-of-interest, and discusses protection of confidentiality. Please read the entire sheet and adhere to the rating scale described.

A rating sheet is enclosed, along with a preaddressed, franked envelope, for return to us by the date indicated. Please be sure to mark the summary rating at the bottom of the sheet. You may retain the bottom copy. Please remove the carbon paper before mailing. If a brief delay in responding is necessary, we prefer a somewhat late review rather than none at all. However, if you cannot review the proposal within a reasonable time, please notify me promptly and destroy the proposal.

Thank you for your help in making our proposal review process a judicious one.

Sincerely yours,

James L. Edwards

James L. Edwards
Associate Program Director
Systematic Biology

NATIONAL SCIENCE FOUNDATION

INFORMATION FOR REVIEWERS OF PROPOSALS

Mail reviews play a key role in the National Science Foundation's evaluation of the scientific merit of proposals. Please provide both written comments and a summary rating using the definitions provided.

WRITTEN EVALUATION

Quality of the Proposed Research

Be candid in your assessment of the proposed research; point out strengths and weaknesses in the approach and content of the proposal. Please comment on the originality and creativity of the proposed research. Be as specific as possible.

Recent Research Achievements of the Principal Investigator(s)

Please comment on the principal investigator(s) recent research record or other evidence of research potential. Does the record suggest that the principal investigator(s) are likely to make an important and original contribution? Evaluate recent research accomplishments, or, especially for younger scientists, other evidence of potential.

Budget and Institutional Capability

Comments on the reasonableness of budget requests for particular items, such as instruments, computer time, research assistants, travel, and other factors, will be helpful. If appropriate, also comment on the research environment, including equipment, and other

resources that are available to accomplish the proposed work.

SUMMARY RATINGS

On the basis of your written comments, please check one of the summary ratings. In making the selection, keep in mind both the quality of the proposal and the principal investigator(s)' recent research record.

Excellent: Probably will fall among top 10% of proposals in this subfield; highest priority for support. This category should be used only for truly outstanding proposals.

Very Good: Probably will fall among top 1/3 of proposals in this subfield; should be supported.

Good: Probably will fall among middle 1/3 of proposals in this subfield; worthy of support.

Fair: Probably will fall among lowest 1/3 of proposals in this subfield.

Poor: Proposal has serious deficiencies; should not be supported.

LENGTH OF PROPOSAL

Because scientists are increasingly concerned about the length of research proposals, the National Science Foundation is encouraging brief and concise proposals. The Foundation has established 15 single-space typewritten pages as a normal limit for the project description portion of research proposals. Somewhat greater length may be appropriate for proposals with multiple investigators or for proposals of unusual complexity.

CONFLICT OF INTEREST

If you have an affiliation or financial connection with the institution or the person submitting this proposal that might be construed as creating a conflict of interest, please describe those affiliations or interests in your own words on a separate piece of paper and attach it to your review. Regardless of any such affiliations or interests, unless you believe you cannot be objective, we would like to have your review. If you do not attach a statement we shall assume that you have no conflicting affiliations or interests.

CONFIDENTIALITY OF PROPOSALS AND PEER REVIEWS

The Foundation receives proposals in confidence and is responsible for protecting the confidentiality of

their contents. For this reason, please do not copy, quote, or otherwise use material from this proposal. If you believe that a colleague can make a substantial contribution to the review, please consult the NSF program officer before disclosing either the contents of the proposal or the applicant's name. When you have completed your review, either return the proposal to the program officer or destroy it.

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The Foundation will publish annually a list of names and addresses of persons who have reviewed proposals. Individuals will not, however, be identified with specific proposals. In this way, the Foundation can publicly acknowledge your services as a reviewer and at the same time protect the confidentiality of your comments.

NATIONAL SCIENCE FOUNDATION
WASHINGTON, D.C. 20550

Subject: Welfare of Animals Used in NSF-Supported Research

To: Ad Hoc Reviewers

Because the quality of data obtained during research may be affected by the condition of experimental animals maintained in the laboratory, we call your attention to National Science Foundation policy regarding the care and maintenance of animals. It is the policy of the Foundation that "any grantee performing research on warmblooded animals will comply with the Laboratory Animal Welfare Act of 1966 (P.L. 89-544, as amended, 7 USC 231 et seq.) and the regulations promulgated there under by the Secretary of Agriculture (CFR, Title 9, Subchapter A)..."

For proposals involving the maintenance of animals for the purposes of research, please comment if you have any concerns regarding the violation of animal welfare laws or guidelines, the exposure of animals to unnecessary pain or mistreatment, or the use of excessive numbers of animals. If the species being used is not the one most appropriate, or if alternative or adjunct methods could be used to eliminate or reduce the need for animal experimentation, please explain.

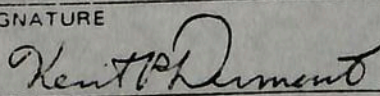
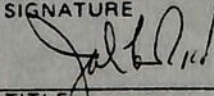
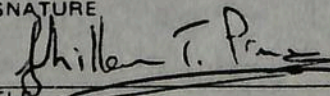
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PROGRAM ANNOUNCEMENT/SOLICITATION NO.:		CLOSING DATE (IF ANY):		
NAME OF SUBMITTING ORGANIZATION TO WHICH AWARD SHOULD BE MADE (INCLUDE BRANCH/CAMPUS/OTHER COMPONENTS) The New York Botanical Garden				
ADDRESS OF ORGANIZATION (INCLUDE ZIP CODE) Bronx, New York 10458				
TITLE OF PROPOSED PROJECT Monographic studies in the Sclerotiniaceae and related Discomycetes				
REQUESTED AMOUNT	PROPOSED DURATION 3 years	DESIRED STARTING DATE 1 July 1983		
PI/PD DEPARTMENT Cryptogamic Herbarium	PI/PD ORGANIZATION The New York Botanical Garden		PI/PD PHONE NO. 212-220-8613	
PI/PD NAME Kent P. Dumont	SOCIAL SECURITY NO.* 020-30-2015	DATE OF HIGHEST DEGREE ACHIEVED 1969	MALE* X	FEMALE*
ADDITIONAL PI/PD				
ADDITIONAL PI/PD				
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ADDITIONAL PI/PD				
FOR RENEWAL OR CONTINUING AWARD REQUEST, LIST PREVIOUS AWARD NO. <u>DEB-11139</u>		IF SUBMITTING ORGANIZATION IS A SMALL BUSINESS CONCERN, CHECK HERE <input type="checkbox"/> (See CFR Title 13, Part 121 for Definitions)		
* Submission of SSN and other personal data is voluntary and will not affect the organization's eligibility for an award. However, they are an integral part of the NSF information system and assist in processing proposals. SSN solicited under NSF Act of 1950, as amended.				
CHECK APPROPRIATE BOX(ES) IF THIS PROPOSAL INCLUDES ANY OF THE ITEMS LISTED BELOW:				
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<input type="checkbox"/> Endangered Species	<input type="checkbox"/> Marine Mammal Protection	<input type="checkbox"/> Research Involving Recombinant DNA Molecules		
<input type="checkbox"/> Historical Sites	<input type="checkbox"/> Pollution Control	<input type="checkbox"/> Proprietary and Privileged Information		
PRINCIPAL INVESTIGATOR/ PROJECT DIRECTOR	AUTHORIZED ORGANIZATIONAL REP.	OTHER ENDORSEMENT (optional)		
NAME Kent P. Dumont	NAME John F. Reed	NAME Ghilleen T. Prance		
SIGNATURE 	SIGNATURE 	SIGNATURE 		
TITLE Curator of Fungi	TITLE Vice-President for Education	TITLE Senior Vice President for Science		
DATE January 12, 1983	DATE January 12, 1983	DATE January 12, 1983		

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NOTICE OF RESEARCH PROJECT
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SMITHSONIAN INSTITUTION
NATIONAL SCIENCE FOUNDATION

SIE PROJECT NO.

NSF AWARD NO.

PROJECT SUMMARY

FOR NSF USE ONLY

DIRECTORATE/DIVISION	PROGRAM OR SECTION	PROPOSAL NO.	F.Y.
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NAME OF INSTITUTION (INCLUDE BRANCH/CAMPUS AND SCHOOL OR DIVISION)

The New York Botanical Garden

ADDRESS (INCLUDE DEPARTMENT)

Herbarium
Bronx, New York 10458

PRINCIPAL INVESTIGATOR(S)

Kent P. Dumont

TITLE OF PROJECT

Monographic studies in the Sclerotiniaceae and related Discomycetes

TECHNICAL ABSTRACT (LIMIT TO 22 PICA OR 18 ELITE TYPEWRITTEN LINES)

The Sclerotiniaceae is a family of plant disease-causing fungi found throughout the temperate and tropical regions of the world. Until the principal investigator's work began in 1971, little collecting had been done in tropical regions, and the species from that part of the world were poorly known and understood. With 8 years of National Science Foundation support, the principal investigator has collected extensively in many neotropical areas: Venezuela, Colombia, Ecuador, Peru, Panama, Brazil. To date, nearly 30,000 collections of varied groups of fungi have been gathered and either studied at New York or distributed to specialists throughout the world, and a total of 32 scientific publications dealing with diversified taxonomic and nomenclatural problems in this group of fungi have been published. The collections and publications have provided an excellent basis for monographing the two large and most important generic names, Ciboria and Rutstroemia. The results of these studies will provide a restructuring of the system of classification of the Sclerotiniaceae and the much needed data for an understanding of the evolution of certain morphological features which will form the basis of that classification. In addition, the relationship between the Sclerotiniaceae and Leotiaceae will be clarified, and the parallel evolution seen in the two families further elucidated. The present proposal outlines specifically the next three-year segment of the research program of the principal investigator. It includes mainly laboratory studies at New York and visits to herbaria in both the United States and in Europe.

1. Proposal Folder
2. Program Suspense
3. Division of Grants & Contracts
4. Science Information Exchange
5. Principal Investigator
6. Off. of Govt. & Pub. Progs.

PROJECT DESCRIPTION

1. Background Information

(Taxonomy of the Sclerotiniaceae and related Discomycetes)

a) Definition of the Sclerotiniaceae. The Sclerotiniaceae was described by Whetzel (1945). The definition of the family has generally been accepted by most recent workers and has been further clarified by Dumont and Korf (1971) and in several papers by Dumont (see Appendix IV). However, as has been demonstrated by Dumont and Carpenter (1981) and by Dumont (1978), the Leotiaceae (=Helotiaceae) is very closely related to the Sclerotiniaceae. This is reflected by the frequent misassignment of species of one to the other.

Many members are important plant pathogens, causing millions of dollars of damage throughout the world on a variety of vegetable and fruit crops, for example:

- 1) Monilinia ss.: Brown rot of stone fruits
- 2) Ciboria carunculoides: popcorn disease of mulberry
- 3) Phaeosclerotinia nipponica: rosary disease of apple
- 4) Botyrotinia spp.: blight and blast of miscellaneous vegetable crops
- 5) Sclerotinia sclerotiorum: Sclerotinia disease of vegetable and field crops.

These fungi perform a very important role in the saprophytic decomposition of plant debris on the forest floor. In selected areas, for example, in tropical rain forests, several species of Sclerotiniaceae may be encountered within a 100 meter radius.

b) Summary of the Taxonomic History of the Family. Species of Sclerotinia, Ciboria, Monilinia and Rutstroemia were known early in the history of mycology. The Sclerotiniaceae as defined by Whetzel contained genera from two of Nannfeldt's (1932) subfamilies - Helotioideae and Ciborioideae. Nannfeldt's classification was essentially based on Boudier's (1885, 1907) works, but also drew on the important works of Starbäck (1886) and Durand (1900). Korf's (1973) treatment of the inoperculate Discomycetes has further refined the Nannfeldt classification.

Whetzel's treatment of the family included 15 genera (see Appendix I for a comparison of the Whetzel and the proposed Dumont systems of classification) which were divided into two main categories: 1) those producing a sclerotial stroma and (2) those producing a substratal stroma. Early workers placed most of the sclerotial producing species in Sclerotinia (which has been recently monographed by Kohn, 1979) and those producing a substratal stroma (more than

250 species) in Ciboria and Rutstroemia. The majority of the species placed in the latter two genera have not been studied critically and have not been re-described since their original publication, and their status and placement is currently uncertain. Following Whetzel's treatment, additional species and genera were added to the family by many workers, and the previously vague species and generic concepts became almost incomprehensible, especially in the Ciboria-Rutstroemia complex. Further, the once obvious separation between the Sclerotiniaceae and the Helotiaceae (Leotiaceae) is now in question, and the family circumscriptions are uncertain. When the Principal Investigator began his work in 1965, the state of taxonomy in the Sclerotiniaceae was confused and deficient in many areas, and was in bad need of major restructuring to bring order to the existing chaos. Workers in the field could no longer identify field collections and place appropriate names on specimens with any degree of confidence.

As a result of the principal investigator's National Science Foundation supported research, many of these taxonomic problems have been resolved, and many of the hitherto vague limits and concepts have been defined or clarified and are better understood. As a result of the extensive field work carried out in the program to date, material is now available to help begin to understand neotropical representatives of the family.

c) Current State of Taxonomy in the Sclerotiniaceae. Korf's 1973 treatment of the Discomycetes has demonstrated that although much monographic work has been done and is being done in the operculate Discomycetes, little monographic work has been produced in recent years in the inoperculate groups. More specifically, Dumont (see Appendix IV) has repeatedly pointed out the need for monographic work in the Sclerotiniaceae and has indicated that in the few recent works treating the family, only Kohn's (1979) treatment of Sclerotinia represents a detailed monograph.

Korf and Dumont (1968) demonstrated the critical importance of detailed species description and illustrations of microanatomy of the apothecium of the Sclerotiniaceae in separating and recognizing species and even certain genera. (See Appendix V for a diagrammatic representation of an apothecium illustrating different tissue layers used in the classification of species and genera.) However, except in Dumont's recent works and those of Batra (1960), Batra and Korf (1959), Hennebert and Groves (1963), Tewari and Pant (1967), etc. extant literature provides an inadequate data for the recognition and identification of species in the Sclerotiniaceae.

For the most part, collections of the Sclerotiniaceae have been made in North Temperate regions. The species in these regions are relatively well-known to the principal investigator, who has studied the vast majority of those in the substratal genera. Dumont (1971, 1976) demonstrated the importance of and simultaneous lack of data about tropical species when he delimited and monographed Lambertella and Moellerodiscus. The tropical representatives of the family are now better understood, but a major problem is now the naming of the hundreds of field collections. The studies presented here compliment well the work being done elsewhere by other investigators such as Linda Kohn (Sclerotinia, Dumontinia and Elliottinia), L. R. Batra (Monilinia at BPI), V. P. Tewari (miscellaneous Indian species at BHUPP), and M. P. Sharma (miscellaneous species from India at Punjab University).

Whereas the Sclerotiniaceae is rather easily characterized by the presence of a stroma, practically it is not always easy to locate the stroma on specimens, especially in the substratal species. For this reason many early workers assigned species to Helotium in the Helotiaceae (Leotiaceae) when they should have been placed in the Rutstroemia-Ciboria complex. Dumont (1981) found 72 species of Helotium and Hymenoscyphus reported from the neotropics. Of these 72 species, 23 were members of the Sclerotiniaceae, 26 belonged in the Helotiaceae (Leotiaceae), for 18 no voucher material could be found, and the remainder were distributed to other families.

However, it should be noted that the Principal Investigator's studies (unpublished) have discovered many species placed in the Ciboria-Rutstroemia complex which should have been placed in the Helotiaceae. Thus, the vast majority of the hairless, stipitate, inoperculate discomycetes growing on decaying wood, herbaceous stems and leaves falls into this "Helotium -Ciboria-Rutstroemia complex". Because species of Ciboria-Rutstroemia are still unstudied, confusion exists as to what names should be used in two families, generic concepts are vague and family delimitations are uncertain.

White (1941) attempted to sort out the species assigned to Rutstroemia, but he placed many species in the same genus which we now distribute to several genera (Rutstroemia sensu stricto, Moellerodiscus, Ciboria, Poculum and Lanzia). He did not study the species of Ciboria, and his studies proved to be incomplete. However, his descriptions and illustrations of many species were excellent, and for the first time a complete knowledge of certain species was obtained. Following White's work, Dennis (1958) attempted to segregate selected species from the complex and described the genus Moellerodiscus, and also began to utilize Seaver's genus Ciboriella. Again, the scope of the work was limited and the majority of species still remain to be described.

The P.I.'s work to date has concentrated on the substratal Sclerotiniaceae and has presented monographs of the smaller genera, and has solved many of the nomenclatural problems. His work has thus bridged the gap between White's and Dennis' early works and the present. His work has prepared a foundation for the remainder of the work, and the preliminary first stages of the program have been successfully completed. Now the monographs of the two large genera, Rutstroemia and Ciboria remain.

Basic to an understanding of the taxonomy of any group is a knowledge of the anatomical-morphological structures being utilized in the organization of that system of classification. To date, very little information or ideas exist in the literature as to evolutionary trends in the Sclerotiniaceae. Thus, as well as gathering information on the classification of the Ciboria-Rutstroemia complex, critical data are needed on the anatomical details for each species.

The basis of the P.I.'s classification into genera is based on the hypothesis that the most primitive or least specialized ectal excipulum of the apothecium is that in which hyphae are imbedded in a gelatinous matrix and that there is an evolutionary development to the *textura prismatica* which culminates in the *textura globulosa*. He has further suggested that the substratal stroma is more primitive than the sclerotial stroma. Thus it is now

necessary to study these species to see if, in fact, the structures of the species yet to be studied support this hypothesis. In the event that this hypothesis and basic framework for the classification of the family prove inadequate, additional tools and methodology will have to be utilized in order to further clarify phylogenetic relationships. For example, the electron microscope could possibly yield information where questions exist. It is also possible that cytological, cultural and cytochemical data would be useful. However, before embarking on these studies, the original hypothesis must be tested.

It is further necessary to study these species to better understand the relationships between the Helotiaceae and the Sclerotiniaceae. Dumont has suggested that there is considerable parallel evolution of the characters as seen in both families. This possible parallel evolution can only be understood by studying the species in the Rutstroemia-Ciboria complex. Until these species are studied morphologically, the relationship between the two families will remain vague and uncertain. Much important information on the evolutionary development of morphological-anatomical features of the fruit bodies of these species still remains unknown. After the species have been studied they can be sorted into the appropriate genera and the genera allied into a natural classification, and the relationship between families understood.

d) The Need for Further Work in the Sclerotiniaceae. Continued monographic studies are needed in the Sclerotiniaceae for the following reasons:

- 1) Reported species and the concepts defining them are becoming better understood through the principal investigator's studies, but they must be fully described and illustrated so that they can be recognized by contemporary mycologists.
- 2) Recent field collections remain to be named correctly. In many cases species concepts are becoming relatively clear, but names must be located for them. The chore of sorting through literature dealing with temperate species and temperate names is immense.
- 3) As many generic concepts and nomenclature are still outdated and confused, revision is required.
- 4) Family limits within the inoperculate Discomycetes and especially the Helotiales are confused. The current study will likely bring forth valuable information to the understanding of the Sclerotiniaceae and to its relationships with the related families Leotiaceae, Dermateaceae and Hyaloscyphaceae.
- 5) Biology of species in many groups is poorly known and must be studied in vivo so that a better understanding of pathogenic forms can be gained.
- 6) Many tropical species are still very poorly known and many areas remain to be collected so that the entire range of species and species variation can be observed.

- 7) Very little information is available concerning evolution of certain anatomical and morphological features in the Inoperculate Discomycetes. Information gained from these studies would add data to the understanding of the evolution of the ectal excipulum and stroma in the Sclerotiniaceae and other discomycetes in general.
- 8) Information received from these studies would provide data for a comparison of the evolution of two very closely related families in the Inoperculate Discomycetes. Very little information exists on the evolution and natural relationships in the Discomycetes.

e) Morphological and Anatomical Characters Being Utilized. In his preliminary papers (see Appendix IV) on the family, the P.I. has discussed the anatomical and morphological characters used in defining genera and species. He (as did Whetzel and White) recognizes two major groupings of genera based on the structure of the stroma: 1) the sclerotial forming genera and 2) the genera producing a substratal stroma. The genera which produce sclerotia are then separated using different combinations of the following characters: location and position of the sclerotium on the substrate, features of the anamorphic states, structure of the ectal excipulum and ascospore ornamentation and pigmentation.

Within the substratal genera, the stroma is utilized less in defining genera than in those producing sclerotia. The anamorphic states have been used in delimiting genera such as Monilinia; however, species in genera such as "Rutstroemia" and "Ciboria" are not known to produce anamorphic states. In Lambertella the structure of the ectal excipulum combined with features of the ascospores were used in generic circumscription. The majority of the genera are distinguished by features of the sterile tissue of the apothecium: the ectal excipulum may or may not have a gelatinous matrix present and the general orientation of the hyphae relative to the surface of the apothecium is also critical in defining genera. In Lanzia, for example, the ectal excipulum is composed of filamentous hyphae and lacks a gelatinous matrix. In Poculum the hyphae are embedded in a gelatinous matrix, while in Ciboria the ectal excipulum is composed of globose to subglobose cells. For further explanation of generic delimitation and the use of morphological features used in defining genera, refer to the key presented in Korf (1973), which was prepared in collaboration with the P.I.

The individual species of the substratal Sclerotiniaceae which do not produce anamorphic states are separated and defined using both morphological and anatomical features of the apothecium. Whereas it has been demonstrated that the microscopic characters of the apothecium are most often used, gross features such as color, size, shape of apothecia and substrate specificity are also utilized. For the specific apothecial characters employed, see Appendix VI.

The majority of the decisions made in defining genera and in separating species have been based upon morphological-anatomical evidence. Should problems develop in defining genera and separating species, additional information will be sought from sources such as the electron microscope, cytochemical data and living cultures.

2. The Principal Investigator's Project

a) Project Goals. The principal investigator began his monographic studies in the Sclerotiniaceae at Cornell University in 1963 and since that time has concentrated his work in that family and those closely related to it. The ultimate goal of the P.I.'s research is a complete, comprehensive monographic treatment of the family. More specifically, the objectives of this program, which will lead to this proposed monograph, are:

- 1) To provide monographic treatments of individual genera of the Sclerotiniaceae and related families, preparatory to a definitive monograph of the Sclerotiniaceae.
- 2) To evaluate the status of several peripheral genera within the Sclerotiniaceae whose placement has been uncertain.
- 3) To provide information on extant nomenclatural problems within the family.
- 4) To conduct field exploration in the neotropics with the primary goal of obtaining needed material for the monographic studies discussed in the present proposal.
- 5) To collect (as comprehensively as possible) and distribute to other specialists working in the neotropics mycological material to be used in floristic and monographic treatments not specifically related to the present monographic work.
- 6) To provide training and field experience in neotropical mycology for qualified students.
- 7) To provide a framework whereby mycologists working in other groups of fungi may conduct field work in collaboration with our established field program.
- 8) To provide data on the evolution of selected morphological and anatomical structures in a closely related group of species, which will result in a significant contribution to the knowledge of evolutionary trends in general in the Inoperculate Discomycetes.
- 9) To provide data on parallel evolution of anatomical-morphological structures and of selected species and genera in two closely related families, Sclerotiniaceae and Helotiacae, which will result in major restructuring of classification in the two families.
- 10) To gather appropriate ecological data on relationships, fruiting times, periodicity, geographic distribution, etc.

b) Accomplishments of the program 1971-1980. With the support of the National Science Foundation's four two-year grants, the principal investigator has published (or has in press) 32 papers, and has collected 30,000 specimens in Venezuela, Colombia, Ecuador, Panama, Brazil and Peru. The

following (see Appendix II) summarizes the specific results, 1971-1980, in response to goals set forth in previous proposals (compare with section (a) above), and the list of publications resulting from the present project is presented below (See Appendix IV).

c). The Current Proposal. The previous sections have outlined the short term and long range goals of the principal investigator's program. As can be seen, the program has progressed in a sequential step by step manner, with field work being coordinated with the publication of short papers dealing with the solution of nomenclatural and limited taxonomic problems, and with the publication of selected monographs of some of the smaller genera. The next step in these monographic studies is a reexamination and reassignment of the species currently placed in Ciboria and Rutstroemia.

During the next three year segment of the P.I.'s project, it is thus proposed to reexamine and to reassign all of the species placed in Ciboria and Rutstroemia and to pave the way for monographs of the individual genera to which they are assigned.

d) Plan of Work. It has been estimated that it will require three years to examine all of the types and authentic material of the species placed into Rutstroemia and Ciboria and to publish the results of these findings. The following specifically outlines the next three year segment of study in the Sclerotiniaceae and also the work for the future:

1. First year of study (1983-1984). During the first year the taxa placed in Rutstroemia will be examined and their placement determined. Much of the work has already been completed and ca 80% of the types have been studied in Rutstroemia, but no illustrations or descriptions have been prepared. The remaining 20% of the described species are primarily European for which type collections could not be located or for which the known specimens are insufficient or too poorly preserved to be interpreted properly. The P. I. will also visit CUP, BPI and FH in this country to consult European exsiccata collections which cannot be loaned, to search out specimens to serve as possible neotypes, and to consult personal notes and collections.

During this period, illustrations of ca. 30 taxa will be prepared. Illustrations of the poorly known species are essential to these studies. Because of the minute size of many of these species, microscopic features are used in separating and defining taxa. Based on the P.I.'s previous experience, detailed illustrations of the microanatomy of the apothecia of these fungi are necessary for each of the proposed publications. The results of the first year's study will be published in the form of three papers in the following order:

- i. A redistribution of White's species of Rutstroemia
- ii. A redistribution of Velenovsky's species of Rutstroemia
- iii. A conspectus of the genus Rutstroemia

2. Second year of study (1984-1985). Whereas in Rutstroemia much of the groundwork has been done and types examined, little work has been undertaken in Ciboria. The second year of the program will concentrate on gathering together the remaining literature and begin ordering and examining the type specimens in Ciboria.

3. Third year of study (1986-1987). During the third year, the P. I. will complete examining all of the types of taxa placed in Ciboria and will prepare the majority of results for publication. He will also take a trip to Europe to visit the major herbaria to search out specimens of species which could not originally be located by local curators. From previous experience, many collections have not been located by curators when they are, in fact, present in the collections and have been misfiled, reidentified and refiled under new names or taxonomic and nomenclatural synonyms. Because of these problems and because of the long and complicated history of many of the species, it is unrealistic to expect local curators, especially of the larger herbaria, to search out and locate these collections, although many have tried without success. Further, many of these type collections have been divided and the "Kleptotypes" redistributed which turn up in unexpected personal collections. It is proposed to visit five herbaria (K, UPS, S, PC and PR) which house historically important collections of this group of fungi. The purpose of the visit will be to locate missing type collections and to locate additional specimens which will be used as neotype specimens for those species in which the types are known to have been destroyed or cannot be located, for both Rutstroemia and Ciboria.

4. Subsequent Work. Following the work on Rutstroemia and Ciboria outlined above, the five genera listed previously will be monographed one by one. A more detailed approach and order of appearance of individual monographs can only be prepared after the current three-year segment is accomplished.

e) Procedures. All field collections and herbarium material to be studied in the laboratory are first rehydrated with 2% KOH or a similar reagent and then sectioned on a freezing microtome at ca. 25 μ m. It is essential to section these apothecia to study the structure of the sterile tissue and to observe the orientation and relative position of the different layers. Observations on material which has been squashed are not always reliable since the different layers frequently become disoriented and distorted, and the relative positions one to the other are often obscured. Selected sections are generally stained with cotton blue dye in lactophenol, 1% aqueous phloxine, analine blue in lactophenol, or Melzer's reagent; occasionally congo red or other specific dyes are also utilized. All sections are studied with a light microscope at a magnification of X1,000.

Selected specimens of several genera have been studied with the scanning electron microscope, but it was concluded that the little information obtained was not sufficient to warrant the additional time, cost and effort needed to study all specimens.

During the early stages of the Principal Investigator's work in Asia and South America, he attempted to culture living material in the field with only minimal success. Further, even when these organisms were obtained in pure

culture, they fruited only rarely, and the culture of one species was generally indistinguishable from another. It was concluded at that time that because of the paucity of information gained from these cultures, it was worth neither the time nor the financial expenditure to continue culturing field collectings. In addition, in the Ciboria-Rutstroemia complex, the species are not known to produce anamorphic states. Because of these difficulties, the P.I.'s research efforts have been directed towards collecting field specimens and examining and comparing dried collections, and little emphasis has been placed on in vitro studies of anatomical and morphological variation. Further, in a project of the type proposed, it is not practical to begin culturing 263 species of fungi to study and compare the cultural variation of each taxon. Rather, experience has shown that in the Sclerotinaceae independent studies of a few selected species, examining these anatomical-morphological features is more productive than attempting to incorporate this work into monographic investigations.

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BIOGRAPHICAL SKETCH

Kent P. Dumont, Principal Investigator

Kent P. Dumont began his research interests in the Sclerotiniaceae at Cornell University in 1963 as a research associate studying diseases of onions caused by species of Botrytis, an anamorphic state of a genus in the Sclerotinaceae. After finishing his doctoral studies he joined the staff of The New York Botanical Garden. Since coming to The Garden in 1969, the P. I. has devoted and will continue to devote, approximately 70-75% of his time on the proposed research project. His other duties are reflective of a museum oriented position: editorial, sorting and distributing field collections for identification, processing identified specimens, identifying his own tropical collections of non-Sclerotiniaceae, upgrading and general curating of the mycological collections at The Garden, and answering public queries of a mycological nature.

For a full outline of the Principal Investigator's biography, see Appendices III & IV.

1st year SUMMARY PROPOSAL BUDGET

FOR NSF USE ONLY		
PROPOSAL NO.	DURATION (MONTHS)	
	Proposed	Granted
AWARD NO.		

ORGANIZATION			
The New York Botanical Garden			
PRINCIPAL INVESTIGATOR/PROJECT DIRECTOR			
Kent P. Dumont			
A. SENIOR PERSONNEL: PI/PD, Co-PI's, Faculty and Other Senior Associates (List each separately with title; A.6. show number in brackets)			
		NSF FUNDED PERSON-MOS.	
		CAL. ACAD. SUMR	
		FUNDS REQUESTED BY PROPOSER	
		FUNDS GRANTED BY NSF (IF DIFFERENT)	
1.	see note 1		\$ 5,333
2.			
3.			
4.			
5.	() OTHERS (LIST INDIVIDUALLY ON BUDGET EXPLANATION PAGE)		
6.	() TOTAL SENIOR PERSONNEL (1-5)		
B. OTHER PERSONNEL (SHOW NUMBERS IN BRACKETS)			
1.	() POST DOCTORAL ASSOCIATES		
2.	() OTHER PROFESSIONALS (TECHNICIAN, PROGRAMMER, ETC.) see note 2		5,000
3.	() GRADUATE STUDENTS		
4.	() UNDERGRADUATE STUDENTS		
5.	() SECRETARIAL-CLERICAL see note 3		2,000
6.	() OTHER see note 4		3,000
TOTAL SALARIES AND WAGES (A+B)			15,333
C. FRINGE BENEFITS (IF CHARGED AS DIRECT COSTS) see note 1			
TOTAL SALARIES, WAGES AND FRINGE BENEFITS (A+B+C)			2,319
			17,652
D. PERMANENT EQUIPMENT (LIST ITEM AND DOLLAR AMOUNT FOR EACH ITEM EXCEEDING \$1,000; ITEMS OVER \$10,000 REQUIRE CERTIFICATION)			
see note 5			
TOTAL PERMANENT EQUIPMENT			
E. TRAVEL 1. DOMESTIC (INCL. CANADA AND U.S. POSSESSIONS) see note 6			
2. FOREIGN			1,500
F. PARTICIPANT SUPPORT COSTS			
1.	STIPENDS \$		
2.	TRAVEL		
3.	SUBSISTENCE		
4.	OTHER		
TOTAL PARTICIPANT COSTS			
G. OTHER DIRECT COSTS			
1.	MATERIALS AND SUPPLIES see note 8		500
2.	PUBLICATION COSTS/PAGE CHARGES		
3.	CONSULTANT SERVICES		
4.	COMPUTER (ADPE) SERVICES		
5.	SUBCONTRACTS		
6.	OTHER		
TOTAL OTHER DIRECT COSTS			500
H. TOTAL DIRECT COSTS (A THROUGH G)			20,152
I. INDIRECT COSTS (SPECIFY)			
TOTAL INDIRECT COSTS see note 10			15,920
J. TOTAL DIRECT AND INDIRECT COSTS (H + I)			36,072
K. RESIDUAL FUNDS (IF FOR FURTHER SUPPORT OF CURRENT PROJECTS GPM 252 AND 253)			
L. AMOUNT OF THIS REQUEST (J) OR (J MINUS K)			
			\$

PI/PD TYPED NAME & SIGNATURE*		DATE	FOR NSF USE ONLY		
Kent P. Dumont <i>Kent P. Dumont</i>		1/12/83	INDIRECT COST RATE VERIFICATION		
INST. REP. TYPED NAME & SIGNATURE*		DATE	Date Checked	Date of Rate Sheet	Initials - DGC
John F. Reed <i>John F. Reed</i>		1/12/83			

2nd year SUMMARY PROPOSAL BUDGET

FOR NSF USE ONLY		
PROPOSAL NO.	DURATION (MONTHS)	
	Proposed	Granted
AWARD NO.		

ORGANIZATION The New York Botanical Garden		PROPOSAL NO.		DURATION (MONTHS)	
PRINCIPAL INVESTIGATOR/PROJECT DIRECTOR Kent P. Dumont		AWARD NO.		Proposed	Granted
A. SENIOR PERSONNEL: PI/PD, Co-PI's, Faculty and Other Senior Associates (List each separately with title; A.6. show number in brackets)		NSF FUNDED PERSON-MOS. CAL. ACADSUMR		FUNDS REQUESTED BY PROPOSER	
1.				\$ 5,866	\$
2.					
3.					
4.					
5. () OTHERS (LIST INDIVIDUALLY ON BUDGET EXPLANATION PAGE)					
6. () TOTAL SENIOR PERSONNEL (1-5)					
B. OTHER PERSONNEL (SHOW NUMBERS IN BRACKETS)					
1. () POST DOCTORAL ASSOCIATES					
2. () OTHER PROFESSIONALS (TECHNICIAN, PROGRAMMER, ETC.)				5,500	
3. () GRADUATE STUDENTS					
4. () UNDERGRADUATE STUDENTS					
5. () SECRETARIAL-CLERICAL				2,200	
6. () OTHER Artist see note 11				3,000	
TOTAL SALARIES AND WAGES (A+B)				16,566	
C. FRINGE BENEFITS (IF CHARGED AS DIRECT COSTS)				2,570	
TOTAL SALARIES, WAGES AND FRINGE BENEFITS (A+B+C)				19,136	
D. PERMANENT EQUIPMENT (LIST ITEM AND DOLLAR AMOUNT FOR EACH ITEM EXCEEDING \$1,000; ITEMS OVER \$10,000 REQUIRE CERTIFICATION)					
TOTAL PERMANENT EQUIPMENT					
E. TRAVEL 1. DOMESTIC (INCL. CANADA AND U.S. POSSESSIONS) see note 13				1,500	
2. FOREIGN					
F. PARTICIPANT SUPPORT COSTS					
1. STIPENDS \$ _____					
2. TRAVEL _____					
3. SUBSISTENCE _____					
4. OTHER _____					
TOTAL PARTICIPANT COSTS					
G. OTHER DIRECT COSTS					
1. MATERIALS AND SUPPLIES see note 8				500	
2. PUBLICATION COSTS/PAGE CHARGES see note 9					
3. CONSULTANT SERVICES					
4. COMPUTER (ADPE) SERVICES					
5. SUBCONTRACTS					
6. OTHER					
TOTAL OTHER DIRECT COSTS				500	
H. TOTAL DIRECT COSTS (A THROUGH G)				21,636	
I. INDIRECT COSTS (SPECIFY)					
TOTAL INDIRECT COSTS				17,092	
J. TOTAL DIRECT AND INDIRECT COSTS (H + I)				38,728	
K. RESIDUAL FUNDS (IF FOR FURTHER SUPPORT OF CURRENT PROJECTS GPM 252 AND 253)					
L. AMOUNT OF THIS REQUEST (J) OR (J MINUS K)				\$	\$

PI/PD TYPED NAME & SIGNATURE Kent P. Dumont	DATE 1/12/83	FOR NSF USE ONLY		
INST. REP TYPED NAME & SIGNATURE John D. Reed	DATE 1/12/83	INDIRECT COST RATE VERIFICATION		
		Date Checked	Date of Rate Sheet	Initials - DGC
				Program

3rd year **SUMMARY PROPOSAL BUDGET**

FOR NSF USE ONLY		
PROPOSAL NO.	DURATION (MONTHS)	
	Proposed	Granted

ORGANIZATION The New York Botanical Garden			PROPOSAL NO.		DURATION (MONTHS)	
PRINCIPAL INVESTIGATOR/PROJECT DIRECTOR Kent P. Dumont			AWARD NO.			
A. SENIOR PERSONNEL: PI/PD, Co-PI's, Faculty and Other Senior Associates (List each separately with title; A.6. show number in brackets)			NSF FUNDED PERSON-MOS. CAL. ACAD SUMR		FUNDS REQUESTED BY PROPOSER	
					FUNDS GRANTED BY NSF (IF DIFFERENT)	
1.					\$ 6,452	
2.						
3.						
4.						
5. () OTHERS (LIST INDIVIDUALLY ON BUDGET EXPLANATION PAGE)						
6. () TOTAL SENIOR PERSONNEL (1-5)						
B. OTHER PERSONNEL (SHOW NUMBERS IN BRACKETS)						
1. () POST DOCTORAL ASSOCIATES						
2. () OTHER PROFESSIONALS (TECHNICIAN, PROGRAMMER, ETC.)					6,050	
3. () GRADUATE STUDENTS						
4. () UNDERGRADUATE STUDENTS						
5. () SECRETARIAL-CLERICAL					2,400	
6. () OTHER Artist see note 11					3,000	
TOTAL SALARIES AND WAGES (A+B)					17,902	
C. FRINGE BENEFITS (IF CHARGED AS DIRECT COSTS)					2,846	
TOTAL SALARIES, WAGES AND FRINGE BENEFITS (A+B+C)					20,748	
D. PERMANENT EQUIPMENT (LIST ITEM AND DOLLAR AMOUNT FOR EACH ITEM EXCEEDING \$1,000; ITEMS OVER \$10,000 REQUIRE CERTIFICATION)						
TOTAL PERMANENT EQUIPMENT						
E. TRAVEL 1. DOMESTIC (INCL. CANADA AND U.S. POSSESSIONS) see note 14					1,500	
2. FOREIGN					4,000	
F. PARTICIPANT SUPPORT COSTS						
1. STIPENDS \$ _____						
2. TRAVEL _____						
3. SUBSISTENCE _____						
4. OTHER _____						
TOTAL PARTICIPANT COSTS						
G. OTHER DIRECT COSTS						
1. MATERIALS AND SUPPLIES see note 8					500	
2. PUBLICATION COSTS/PAGE CHARGES see note 9						
3. CONSULTANT SERVICES						
4. COMPUTER (ADPE) SERVICES						
5. SUBCONTRACTS						
6. OTHER						
TOTAL OTHER DIRECT COSTS					500	
H. TOTAL DIRECT COSTS (A THROUGH G)					27,248	
I. INDIRECT COSTS (SPECIFY)						
TOTAL INDIRECT COSTS					21,526	
J. TOTAL DIRECT AND INDIRECT COSTS (H + I)					48,774	
K. RESIDUAL FUNDS (IF FOR FURTHER SUPPORT OF CURRENT PROJECTS GPM 252 AND 253)						
L. AMOUNT OF THIS REQUEST (J) OR (J MINUS K)					\$ \$	

PI/PD TYPED NAME & SIGNATURE* Kent P. Dumont		DATE 1/12/83	FOR NSF USE ONLY		
INST. REP. TYPED NAME & SIGNATURE* John F. Reed		DATE 1/12/83	INDIRECT COST RATE VERIFICATION		
		Date Checked	Date of Rate Sheet	Initials - DGC	
				Program	

(SEE INSTRUCTIONS ON REVERSE BEFORE COMPLETING)

SUMMARY PROPOSAL BUDGET

FOR NSF USE ONLY		
PROPOSAL NO.	DURATION (MONTHS)	
	Proposed	Granted

ORGANIZATION The New York Botanical Garden			PROPOSAL NO.		DURATION (MONTHS)	
PRINCIPAL INVESTIGATOR/PROJECT DIRECTOR Kent P. Dumont			AWARD NO.			
A. SENIOR PERSONNEL: PI/PD, Co-PI's, Faculty and Other Senior Associates (List each separately with title; A.6. show number in brackets)			NSF FUNDED PERSON-MOS.		FUNDS REQUESTED BY PROPOSER	
			CAL.	ACAD	SUMR	(IF DIFFERENT)
1.						\$ 17,651
2.						
3.						
4.						
5. () OTHERS (LIST INDIVIDUALLY ON BUDGET EXPLANATION PAGE)						
6. () TOTAL SENIOR PERSONNEL (1-5)						
B. OTHER PERSONNEL (SHOW NUMBERS IN BRACKETS)						
1. () POST DOCTORAL ASSOCIATES						
2. () OTHER PROFESSIONALS (TECHNICIAN, PROGRAMMER, ETC.)						16,550
3. () GRADUATE STUDENTS						
4. () UNDERGRADUATE STUDENTS						
5. () SECRETARIAL-CLERICAL						6,600
6. () OTHER Artist						9,000
TOTAL SALARIES AND WAGES (A+B)						49,801
C. FRINGE BENEFITS (IF CHARGED AS DIRECT COSTS)						7,735
TOTAL SALARIES, WAGES AND FRINGE BENEFITS (A+B+C)						57,536
D. PERMANENT EQUIPMENT (LIST ITEM AND DOLLAR AMOUNT FOR EACH ITEM EXCEEDING \$1,000; ITEMS OVER \$10,000 REQUIRE CERTIFICATION)						
TOTAL PERMANENT EQUIPMENT						
E. TRAVEL 1. DOMESTIC (INCL. CANADA AND U.S. POSSESSIONS)						4,500
2. FOREIGN						4,000
F. PARTICIPANT SUPPORT COSTS						
1. STIPENDS \$ _____						
2. TRAVEL _____						
3. SUBSISTENCE _____						
4. OTHER _____						
TOTAL PARTICIPANT COSTS						
G. OTHER DIRECT COSTS						
1. MATERIALS AND SUPPLIES						1,500
2. PUBLICATION COSTS/PAGE CHARGES						
3. CONSULTANT SERVICES						
4. COMPUTER (ADPE) SERVICES						
5. SUBCONTRACTS						
6. OTHER						1,500
TOTAL OTHER DIRECT COSTS						
H. TOTAL DIRECT COSTS (A THROUGH G)						69,036
I. INDIRECT COSTS (SPECIFY)						
TOTAL INDIRECT COSTS						54,538
J. TOTAL DIRECT AND INDIRECT COSTS (H + I)						\$ 123,574
K. RESIDUAL FUNDS (IF FOR FURTHER SUPPORT OF CURRENT PROJECTS GPM 252 AND 253)						
L. AMOUNT OF THIS REQUEST (J) OR (J MINUS K)						\$ 123,574

PI/PD TYPED NAME & SIGNATURE* Kent P. Dumont <i>Kent P. Dumont</i>		DATE 1/12/83	FOR NSF USE ONLY		
INST. REP. TYPED NAME & SIGNATURE* John F. Reed <i>John F. Reed</i>		DATE 1/12/83	INDIRECT COST RATE VERIFICATION		
		Date Checked	Date of Rate Sheet	Initials - DGC	
				Program	

Budgetary Notes

1. Support is requested for 2/9 of the Principal Investigator's salary and fringe benefits, and FICA for per diem help at the rate of .659%. *
2. This figure represents the projected per diem salary for a part-time technician and is based on a projected 1000 hours of work (20 hours/week for 50 weeks) at a salary of \$5.00/hour. In the event a graduate student should become available to work in the proposed program, the funds would be used to support a student. The main responsibilities would be sectioning and preparing material for examination.
3. This figure represents the projected per diem cost of a secretary whose duties it would be to type the various manuscripts and correspondence resulting from the proposed diagram. This figure is calculated on a projected 20 hours per week for 40 weeks at \$5.00/hour.
4. This figure represents the anticipated cost of supporting an artist to prepare approximately 50 plates for the first year of the proposed program. Each plate is prepared at a cost of \$60.00.
5. The New York Botanical Garden has sufficient equipment, some of which has been purchased on previous NSF grants, to support the proposed research.
6. This figure represents the proposed expenses to be incurred while visiting various herbaria in the U.S. It is broken down as follows: per diem costs (12 days at \$75/day) ca. \$1000, and travel expenses @ \$500. Visits are planned to CUP, BPI, FH, F, all of which have important holdings of the Sclerotiniaceae.
7. This figure represents the approximate cost of supplies needed for normal laboratory and secretarial operations at NY. Pens, paper, ink and artists supplies are also needed. Miscellaneous chemical reagents and laboratory glassware will be needed.
8. This figure represents the cost of publication of results of the present study. The P. I. will publish the information in MYCOTAXON where there are no page charges.
9. The indirect cost is a predetermined percentage calculated on all direct costs and has been negotiated at 79%.
10. During the second and third years of the project, it is estimated that 50 plates will be prepared each year at a cost of \$60.00 per plate.
11. The increase in these figures over the first year represents an inflationary increase of 10%.
12. During the final year of the proposed project, a final trip to Europe is necessary to solve the remaining problems encountered during the first two years of the program.

* Fringe benefits of the Principal Investigator are \$1,333 and \$1,186 for per diem help.

13. This figure represents the anticipated cost of international travel required to visit several European herbaria such as K. O. S, UPS, PC, PRM, etc. The figure is broken down as follows:

Air Fare:	\$1,750
Per Diem:	<u>2,250</u> (22 days at \$100/day)
	\$4,000

CURRENT AND PENDING SUPPORT

The Principal Investigator is in the final stages of the fourth two-year NSF grant supporting his work at New York. No carryover of funds from this current grant is anticipated. No other financial support is or has been sought by the principal investigator for the research described in this proposal.

APPENDIX I

Comparison of the Whetzel and proposed Dumont Systems of classification of the Sclerotiniaceae.

	<u>Whetzel</u>	<u>Proposed Dumont</u>
Sclerotial forming genera		
	Sclerotinia	see Kohn 1979
	Stromatinia	?
	Verpatinia	?
	Septotinia	?
	Ciborinia	Ciborinia
	Streptotinia	Streptotinia
	Martinia	Martinia
	Botryotinia	Botryotinia
	Ovulinia	?
	Coprotinia	
	Monilinia	
	Ciboria	
Substratal forming genera		
	Rutstroemia	Monilinia
	Lambertella	Moellerodiscus
	Seaverinia	Ciboria
		Poculum
		Lanzia
		Rutstroemia
		Lambertella
		Seaverinia

APPENDIX II

Accomplishments 1971-1980

1. The following genera have been monographed by the Principal Investigator:

- a) Pseudociboria (Dumont, 1974)
- b) Coprotinia (Dumont, 1975)
- c) Ciboriella (Dumont, 1975)
- d) Moellerodiscus (=Ciboriopsis) (Dumont, 1976)
- e) Martininia (Dumont, 1973)
- f) Asterocalyx (Dumont & Carpenter, 1977)
- g) Lambertella (Dumont, 1971)

Several papers have redescribed previously known species or are only partial generic treatments:

- a) Dumont, 1974
- b) Dumont, 1976
- c) Dumont & Batra, 1978
- d) Dumont & Pal, 1978
- e) Dumont, 1980
- f) Dumont, 1981
- g) Dumont & Carpenter, 1981
- h) Carpenter, 1981

2. The status of several peripheral genera of uncertain placement has been studied by the Principal Investigator:

- a) Poculum (Dumont, 1972)
- b) Lanzia (Dumont, 1972)
- c) Calycina (Dumont, 1972)
- d) Pachydisca (Dumont, 1975)
- e) Piceomphale (Dumont & Korf, 1971)
- f) Chlorociboria and Chlorosplenium (Dixon, 1974, 1975)
- g) Phaeosclerotinia (Korf, 1973)
- h) Phialea (Dumont & Korf, 1977; Carpenter & Dumont, 1978; Carpenter, 1981)
- i) Chloroscypha, Parthenope, Pycnopeziza, Septatium (material of these genera has been studied but the results not published since these names have no bearing on current taxonomic studies).

3. Several nomenclatural problems have been discussed and the results of the findings of the Principal Investigator have been reported in the following papers.

- a) Martininia (Dumont & Korf, 1970)
- b) Several Genera (Dumont & Korf, 1971)
- c) Poculum, Calycina, Lanzia (Dumont, 1972)
- d) Phialea microspora and Helotium atrosubiculum (Dumont, 1974)
- e) Pachydisca (Dumont, 1975)
- f) Whetzelinia (Dumont & Korf, 1974)

- g) Sclerotinia (Dumont & Korf, 1972)
- h) Stromatinia (Rogers, Dumont & Korf, 1971)
- i) Phialea (Dumont & Korf, 1977)
- j) Rutstroemia (Korf & Dumont, 1977)
- k) Several related genera in the Leotiaceae (Carpenter & Dumont, 1977)

4 and 5. The following is a summary fo the field work conducted with the support of the four NSF grants:

a) The following is a list of the countries in which mycological expeditions were carried out and the approximate number of collections made in each (approximately 1/2 of all collections are of Discomycetes, the remainder being miscellaneous groups):

- 1) 1971: Venezuela, 3500
- 2) 1972: Venezuela, 3500
- 3) 1974: Columbia, 2000
- 4) 1975: Panama, 2500
- 5) 1975: Ecuador, 2500
- 6) 1976: Peru, 300
- 7) 1976: Colombia, 6300
- 8) 1977: Brazil, 1000
- 9) 1978: Colombia, 2000

b) All of the specimens from the above listed trips have been duly curated and sorted and are either being studied at New York or have been distributed to other specialists. With the exception of a few specimens, from a recent trip, all specimens of the Sclerotiniaceae have been sectioned, examined and identified where possible. (See Appendix V for list of those collaborating with the present project.)

c) Several hundred identifications of specimens made on these trips have been made. During the last two years of Foundation support, 3000 + specimens have been identified, processed and filed in the collections of The New York Botanical Garden.

d) Many collections of the Principal Investigator have been cited in papers by the following:

Lowy (Tremellales)	The group at TRTC (dung fungi)
Singer (Agaricales)	Buritica (rust fungi)
Welden (Thelephoraceae)	Molina (smut fungi)
Samuels (Hypocreaceae)	Dixon (Leotiaceae)
Carpenter (Leotiaceae)	Sherwood (Ostropales)
Crane & Dumont (Fungi Imperfecti)	Brodie (Nidulariales)
Bezzera (Pezizales)	Haines (Hyaloscyphaceae-
Pfister (Operculate Discomycetes)	Discomycetes)
Guzman (Agaricales)	Rogers (Xylariaceae)
Korf (Inoperculate Discomycetes)	Setliff (Polyporaceae - in press)
Farr (Myxomycetes)	

e) Other collections are currently being studied by those preparing monographic and floristic treatments: Reynolds (Capnodiales, etc.), Guzman (Psilocybe), Carpenter (Leotiaceae), Ponce de Leon (Lycoperdales), Sherwood (Ostropales), Haines (Hyaloscyphaceae) etc.

f) As a result of the collaborative program in Colombia seven papers have been submitted for publication in Caldasia and one in Mycologia:

1. Dumont, K. P., Buritica, P., & E. Forero. 1978. Los Hongos de Colombia I. Introducion. Caldasia 12 (57): 159-164.
2. Buritica, P. 1978. Los Hongos de Colombia II. Nuevas especies de Uredinales. Caldasia 12 (57): 165-170
3. Molina, L. A. Los Hongos de Colombia III. Los Ustilaginales de Colombia. Caldasia: in Press.
4. Carpenter, S. E. & K. P. Dumont. 1978. Los Hongos de Columbia IV. Bisporella triseptata and its allies in Colombia. Caldasia 12 (58): 339-348.
5. Dumont, K. P. & M. I. Umana. 1978. Los Hongos de Columbia V. Laternea triscapa y Calostoma cinnabarina en Colombia. Caldasia 12 (58): 349-352
6. Rogers, J. D. & K. P. Dumont. 1979. Los Hongos de Colombia VI. Two applanate species of Hypoxylon. Mycologia 71: 807-810.
7. Dumont, K. P. & S. E. Carpenter. 1981. Leotiaceae II. Los Hongos de Colombia VII. Hymenoscyphus caudatus and related species from Colombia. Caldasia: In Press.

6 & 7. To date, the Principal Investigator has taken with him two U. S. students, J.H. Haines and S. E. Carpenter, both supported on the foundation grants, to train in tropical mycology and to act as collectors and field assistants. Haines accompanied trips in Venezuela and Colombia; Carpenter to Panama, Colombia, Ecuador and Peru. Other mycologists with outside support have also accompanied the trips: Drs. Roy Cain, G. J. Samuels, M. A. Sherwood, P. Buritica, L. A. Molina, D. R. Reynolds, G. Guzman, L. Ryvarden, F. Oberwinkler, etc. Several additional U. S. mycologists have indicated a desire to participate in future trips. Such participation has been important in training of local nationals and in the spirit of good will.

8) The Principal Investigator has collected considerable material in many unrelated groups and has identified many of the collections to species, but it is too early to draw concrete conclusions on relationships, fruiting periodicity, succession and distribution.

a) The Principal Investigator has noted poor representation of some groups at certain elevations such as lowland rain forests, and greater species diversity at higher elevations.

b) Since Bogota, Colombia has been the center of my field operations, the Principal Investigator has had the opportunity to revisit the same localities there on each of the trips during different times of the year, and will continue to do so until enough meaningful information has been gathered and critically analyzed. It is not possible to study the periodicity of fungi from the neotropical region, but it is felt that a study such as the one being done in Colombia will yield important information on fruiting times.

c) The Principal Investigator feels that there is a definite mycological succession related to alternating wet and dry periods, but cannot offer further generalizations, as yet. The study in Colombia discussed in section 8(b) above, will also contribute data toward the resolution of this problem about which very little is known in tropical fungi.

d) In the Sclerotiniaceae we have been gathering specific information on species distribution and now recognize the following distributional patterns:

- 1) endemics
- 2) pantropical
- 3) neotropical
- 4) cosmopolitan
- 5) Neotropics -- Asia
- 6) Neotropics -- North America
- 7) Neotropics -- Europe

APPENDIX III

The Principal Investigator: Biographical Sketch

DR. KENT P. DUMONT

Born: July 19, 1941

Education:

A.B. Biology, Gettysburg College, 1963
M.S. Mycology, Cornell University, 1965
Ph.D. Mycology, Cornell University, 1969

Married: Gail Lardon Dumont, August 1963

3 children: Colette Parsons, Marcell Parsons, Kristian Parsons

PROFESSIONAL POSITIONS:

Curator, The New York Botanical Garden, 1969 to present
Adjunct Professor, Lehman College, City University of New York, 1969-
Member graduate faculty of City University of New York, 1969-

SOCIETIES:

Sigma Xi

SECOND INTERNATIONAL MYCOLOGICAL CONGRESS:

Member of Program Committee, representing neotropical mycology

ORGANIZATION FOR FLORA NEOTROPICA

1970- Associate Director Cryptogams
1976 - Scientific Director Cryptogams

PROJECT FLORA AMAZONICA

Member Coordinating Committee, representing Cryptogams

GRANTS AND FELLOWSHIPS

Graduate fellow, University Philippines - Cornell University, Graduate
Education Program, 1965-1966

Cornell University Travel Grant, 1968

National Science Foundation two-year grant, 1971-1973, GB 28593

National Science Foundation two-year grant, 1973-1975, GB 28593 A, No. 2

National Science Foundation two-year grant, 1975-1977, GB 28593 A, No. 3

National Science Foundation two-year grant, 1978-1981, GB 28593 A, No. 4

(The above 4 grants from systematic division supporting "Monographic
Studies in the Sclerotiniaceae and related Inoperculate Discomycetes".)

FIELD WORK:

1965-1966 (12 months) Southeast Asia, including Japan, Okinawa, Taiwan, Philippines, Borneo, Malay Penin., Java, Ceylon, India

- 1967 Mexico (3 months)
- 1968 Amazonian Brasil (3 months)
- 1970 Jamaica (1 month)
- 1971 Venezuela (3 months)
- 1972 Venezuela (3 months)
- 1974 Colombia (3 months)
- 1975 Panama, Colombia, Ecuador (6 months)
- 1976 Colombia, Peru (6 months)
- 1977 Brazil (1.5 months)
- 1978 Colombia (2 months)

TOTAL MYCOLOGICAL COLLECTIONS TO DATE: 30,000 +

APPENDIX IV

The Principal Investigator: Scientific Publications

- Dumont, K. P. 1971. Sclerotiniaceae II. Lambertella. Mem. N. Y. Bot. Gard. 22(1): 1-178.
- _____. 1972. Sclerotiniaceae III. The generic names Poculum, Calycina and Lanzia. Mycologia 64: 911-915.
- _____. 1973. Sclerotiniaceae IV. Martininia. Mycologia 65: 175-198.
- _____. 1974. Sclerotiniaceae V. On some tropical Lambertella species. Mycologia 66: 341-346.
- _____. 1974. Sclerotiniaceae VI. Pseudociboria. Mycologia 66: 706-712.
- _____. 1974. Sclerotiniaceae VII. On Phialea microspora and Helotium atro-subiculatum. Mycologia 66: 1039-1041.
- _____. 1975. Sclerotiniaceae VIII. The generic name Pachydisca. Mycologia 67: 161-167.
- _____. 1975. Sclerotiniaceae IX. Coprotinia. Mycologia 67: 32-33.
- _____. 1975. Sclerotiniaceae X. Ciboriella, a taxonomic synonym of Lanzia. Mycologia 67: 569-585.
- _____. 1976. Sclerotiniaceae XI. Moellerodiscus (=Ciboriopsis). Mycologia 68: 233-267.
- _____. 1976. Sclerotiniaceae XII. On some selected species from India. Mycologia 68: 842-873.
- _____. 1980. Sclerotiniaceae XVI. On Helotium rufo-corneum and Helotium fraternum. Mycotaxon 12: 255-277.
- _____. 1981. Leotiaceae II. A preliminary survey of the neotropical species referred to Helotium and Hymenoscyphus. Mycotaxon 12: 313-371.
- _____. 1981. Leotiaceae III. Notes on selected temperate species of Helotium. Mycotaxon 13: 59-84.
- _____ and Batra. 1978. Sclerotiniaceae XIII. An undescribed species on Berberis. Mycologia 70: 61-67.
- _____, P. Buritica, and E. Forero. 1978. Los Hongos de Colombia I. Introduction. Caldasia 12(57): 159-164.
- _____ and S. E. Carpenter. 1978. Sclerotiniaceae XIV. Asterocalyx. Mycologia 70: 68-75.

Dumont, K. P. and R. P. Korf. 1970. Nomenclatural notes VI. A new name Martininia to replace Martinia (Sclerotiniaceae). Mycologia 62: 608-609.

_____ and _____. 1971. Sclerotiniaceae I. Generic nomenclature. Mycologia 63: 157-168.

_____ and _____. 1978. The generic name Phialea. Nomen Rejiciendum Propositum under revised article 69. Taxon 26: 598-600.

_____ and K. P. Pal. 1978. Sclerotiniaceae XV. Additional species from India. Mycologia 70: 76-86.

_____ and M. I. Umana. 1978. Los Hongos de Colombia V. Laternea triscapa y Calostoma cinnabarina reportada de Colombia. Caldasia 12(58): 349-352.

Carpenter, S. E. and K. P. Dumont. 1978. Los Hongos de Colombia IV. Bisporella triseptata and its allies in Colombia. Caldasia 12(58): 339-348.

Farr, M. L., U. Eliasson and K. P. Dumont. 1979. Mycomycetes from Ecuador. Mycotaxon 8: 127-134.

Korf, R. P. and K. P. Dumont. 1968. The case of Lambertella brunneola. An object lesson in taxonomy of the higher fungi. J. Elisha Mitchell Sci. Soc. 84: 242-247.

_____ and _____. 1972. Whetzelinia, a new generic name for Sclerotinia sclerotiorum and S. tumerosa. Mycologia 64: 248-251.

_____ and _____. 1977. Nomenclatural notes X. Typification of Rutstroemia: a rebuttal. Mycotaxon. 5: 517-518.

Rogers, J. D. and K. P. Dumont. Los Hongos de Colombia VI. Two new applanate species of Hypoxylon. Mycologia 71: 807-810.

Rogers, J. K., K. P. Dumont & R. P. Korf. 1971. Nomenclatural notes VIII. Stromatinia, an available name (not to be replaced by Tarzetta, the correct name for Pustulinia). Mycologia 63: 1084-1086.

Publications in Press:

Samuels, G. J. and K. P. Dumont. 1981. The genus Nectria in Panama. Caldasia:

Dumont, K. P. and S. E. Carpenter. 1981. Leotiaceae IV: Los Hongos de Colombia VII. Hymenoscyphus caudatus and related species from Colombia. Caldasia:

APPENDIX V

Diagrammatic representation of an apothecium indicating distribution of tissue layers*

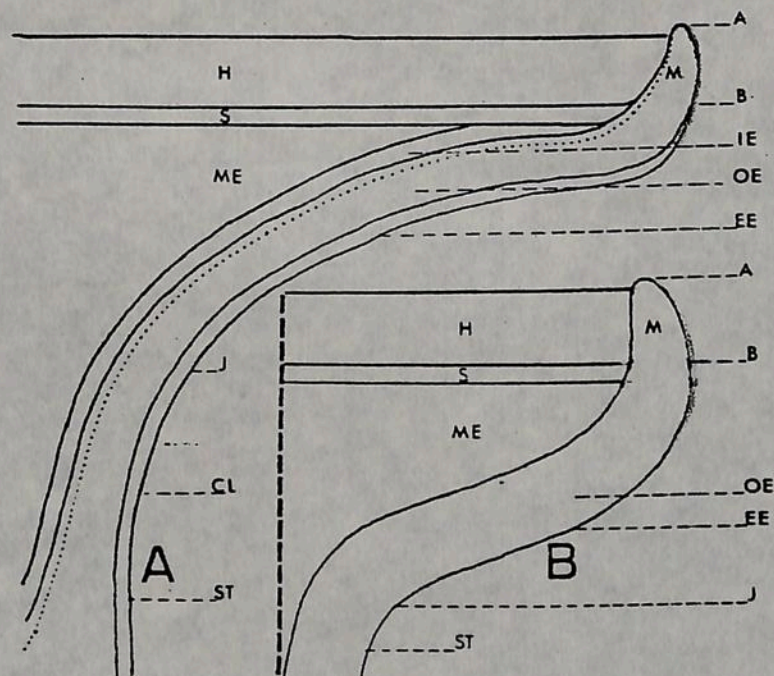


FIG. 1. Diagrammatic representation of a portion of a median longitudinal section through apothecia showing distribution of tissues. A. Apothecium with a complex ectal excipulum, the medullary excipulum terminating before the base of the margin, the inner ectal excipulum not continuing into the margin, and dotted line representing another alternative with inner ectal excipulum continuing into the margin. B. Apothecium with an undifferentiated ectal excipulum and the medullary excipulum continuing to the base of the margin. a = apex of margin; b = base of margin; cl = outer covering layer; ec = ectal excipulum; h = hymenium; ie = inner ectal excipulum; j = juncture of stipe and receptacle; m = margin; me = medullary excipulum; oe = outer ectal excipulum; s = subhymenium; st = stipe.

* Taken from: K. P. Dumont, 1971, Sclerotiniaceae II. Lambertella. Mem. New York Bot. Gard. 22(1): 1-178.

APPENDIX VI

Characters most often used in separating and defining species
of the substratal Sclerotiniaceae

HYMENIAL CHARACTERS (Apothecium)

A. Asci

1. size
2. shape
3. reaction in 2 p.c. KOH (heated)
4. unusual features of the apex

B. Ascospores

1. size
2. shape
3. septation
4. pigmentation
5. ornamentation
6. wall thickness
7. guttulation

C. Paraphyses

1. apex size and shape
2. extension beyond level of asci
3. pigmentation
4. roughenings

NON-HYMENIAL CHARACTERS OF THE APOTHECIUM

A. Margin

1. size and shape of apically free terminal cells
2. shape
3. pigmentation
4. position of the asci

B. Ectal excipulum:

1. Outer covering layer
 - a. pigmentation
 - b. roughenings of hyphae
 - c. protrusions
 - d. width of entire layer
3. number of hypae in layer
2. Hairs
 - a. size and shape
 - b. septation
 - c. pigmentation
 - d. unusual features

3. Outer ectal excipulum
 - a. hyphal composition
 - b. individual features of hyphae or globose cells
4. Inner ectal excipulum
 - a. presence or absence
 - b. individual features of hyphae
5. Medullary excipulum
 - a. presence or absence of gelatinous matrix
 - b. individual features of hyphae

C. Stipe

1. general structure
2. presence or absence of hairs
3. composition of base of stipe
4. individual features of hyphae or globose to subglobose cells

APPENDIX - VII

Proposed parallel evolution in the Leotiaceae and Sclerotiniaceae

<u>Structure of ectal excipulum</u>	<u>Leotiaceae</u> (selected genera)	<u>Sclerotiniaceae</u> (selected substratal genera)
1. Gelatinous matrix present	Ombrophila Ascocoryne	? <u>Rutstroemia</u> (S. stricto) Poculum Asterocalyx
2. Gelatinous matrix absent		
a. narrow, long-celled hyphae	Hymenoscyphus	Lanzia
b. short, broad-celled hyphae	Hymenoscyphus	Lanzia Lambertella
c. globose cells present	Encoelia	Ciboria Moellerodiscus

APPENDIX VIII

The Facilities: The New York Botanical Garden

The New York Botanical Garden houses one of the largest library collections in the world, and those references not at The Garden are obtained from other institutions on loan or by photocopy. The Garden's collection of the Sclerotiniaceae is particularly rich since Dr. Fred J. Seaver was on the staff here for many years. Since coming to The Garden, the P.I. has continued to add to these already valuable collections.

The principal investigator has all of the equipment needed for the proposed project. Much of the equipment was purchased on earlier National Science Foundation sponsored grants, while the remainder was already present at the Garden. The New York Botanical Garden, as a museum oriented institution is an ideal place to carry out the type of systematic work described in the current proposal. Systematic research, maintenance of a reference library and maintenance and growth of reference botanical collections are amongst the most important priorities at an institution of this sort.

AW
DEPARTMENT OF BIOLOGY
TULANE UNIVERSITY
NEW ORLEANS, LA. 70118
USA

Dear Bernie

~~I shall gratefully appreciate a copy of your paper entitled:-~~

Many thanks! You
were very kind

~~which appeared in~~

~~Thank you~~

Cordially ~~Very truly yours,~~

Arthur

TULANE UNIVERSITY

NEW ORLEANS, LA. 70118

AC 504 865-6226

Department of Biology

February 12, 1981

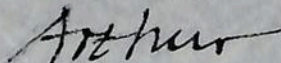
Dr. Bernard Lowy
Department of Botany
Louisiana State University
Baton Rouge, Louisiana
70803

Dear Bernie,

Would you be kind enough to fill in and send the enclosed evaluation sheet to the A. P. S.? You can discard the grant proposal after you've through with it.

Hope your work goes well.

Cordially,



A. L. Welden

ALW/dg

American Philosophical Society

PLEASE DO NOT FOLD

Held at Philadelphia for Promoting Useful Knowledge

104 South Fifth Street, Philadelphia, Pa. 19106

(Please type within indicated margin with a heavily inked ribbon, on one side of page only.)

The Committee on Research of the American Philosophical Society would appreciate your opinion in connection with the application of Arthur L. Welden for a grant of \$1,250.00.

Please discuss project and qualifications of applicant for the proposed research below.

1. PROJECT: (importance, feasibility, etc.): The collection and study of the fungi in virtually all parts of tropical America lags far behind similar studies of higher plants. Nonetheless, ecologists, systematists and other biologists recognize the need for making an inventory of the flora and fauna of the tropics, which are among the poorest understood and botanically neglected regions of the earth, yet potentially among the most promising. The project outlined by Dr. Welden is a logical and necessary starting point for such an inventory in Costa Rica. Because of the country's small size a month's intensive field work in diverse geographical areas, as suggested, should yield sufficient significant data to establish a base upon which subsequent work can go forward. Meanwhile, herbaria both in Costa Rica and the U.S. will be enriched. Because of the accelerated rate of exploitation of natural resources in the tropics, many plants and animals are now in danger of extinction. Basic investigations of the kind here proposed are consequently of some urgency since they can also suggest rational, scientifically sound alternatives for appropriate land use.

I strongly recommend that the modest budget request be fully implemented.

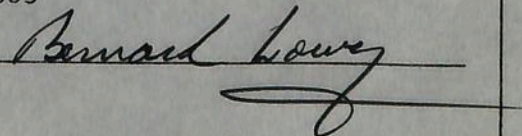
2. APPLICANT (Qualifications, general record or promise): Dr. Welden is a distinguished mycologist whose more than two decades of research on the stereoid fungi of the American tropics has resulted in the discovery of numerous new species, in an important reevaluation of taxonomic criteria, and in the elucidation of phylogenetic relationships among these and related fungi. Dr. Welden's years of field experience throughout Mexico and much of Central America will be an invaluable asset contributing toward the success of this mission.

Name and position of referee (please type) Bernard Lowy, Professor Emeritus of Botany

Institution Louisiana State University, Baton Rouge, LA 70803

Date: February 12, 1981

Referee's signature



American Philosophical Society

Held at Philadelphia for Promoting Useful Knowledge

104 South Fifth Street, Philadelphia, Pa. 19106

FOR OFFICE USE ONLY

Ack'd: _____

Class. _____

Prev. grants _____

Reports - YB: _____

Applications must be typewritten on one side of page only, with heavily inked ribbon and signed by the applicant. Type within indicated margins. Return original only, not photocopy. DO NOT FOLD.

1. Name of Applicant: Arthur L. Welden

Date: February 11, 1981

a. Mail address: Dept. of Biology, Tulane Univ., New Orleans, La., 70118

b. Place and date of birth: B'ham, Ala., 27 January 1927.

c. Education and degrees with institutions and dates: A. B., B'ham - Southern College, 1950
M. S., Univ. of Tenn., 1951
Ph.D., Univ. of Iowa, 1954

d. Present position (institution and rank):

Ida Richardson Prof. of Botany, Tulane Univ.

e. Number of dependents:

Frances Colvin Welden (Wife)

2. Project: a. Describe in ten words or less, using non-technical terms

Collection for a fungus flora of Central America.

b. Explain the project, and indicate the relation of your investigation to previous and current work on the subject, by yourself or others (using page 3 if necessary):

See separate page.

c. Under what major field of science, scholarship, or the arts do you classify this project?

Botany (Mycology)

d. If proposed study involves the use of foreign languages, state your competence in these languages:

Not fluent in Spanish but can speak it.

3. Total amount requested from the Society: \$1,250.00

a. Budgeting of this sum to be specified *in detail*, e.g., unusual equipment, field work, travel, fares, subsistence during travel, photocopying.

RT airfare San Jose, C.R.	ca.	400.00
Vehicle rent @ ca \$30.00/day including ins. for about 16 days		480.00
Gasoline @ ca \$3.00/gal for 16 days		370.00
		<u>\$1,250.00</u>

b. Person or institution (no charge for overhead is allowed) to whom payments should be made and schedule of payments desired:

Tulane University

One time lump-sum payment before 1 July 1981.

If a grant involving travel abroad is approved no payment will be made until the Society has the following information: (1) that a passport from the State Department can be secured and if necessary a foreign visa, and (2) that, if the work is to be done in any laboratory or library abroad, adequate access to the same has been assured and the material to be studied will be available.

I now have a valid passport and there are no restrictions for travel to

Costa Rica. There is no difficulty in obtaining visas for Costa Rica.

4. a. Design of research; places and institutions where the investigation is to be carried on:

Ordinary field collecting techniques will be used. A few days will be spent in San Jose, particularly at the end of the foray, processing and duplicating specimens for deposit in Costa Rica. About one week will be spent at La Selya, a lowland rainforest station on the Atlantic side, followed by about two weeks in southern Costa Rica near Palmar Norte and San Vito. These stations will cover lowlands, uplands, and Atlantic and Pacific slopes.

- b. Duration of proposed investigation under this grant, give dates:

About one month during the summer of 1981 will be devoted to this collecting foray. c. Proposed method and means of publication: The fungi collected will be incorporated into a manual for the region, but separate reports of interesting species will be published as short papers in such journals as Mycotaxon and Mycologia.

5. Amount and source of institutional contributions toward this work (if you are receiving no aid on this project from your institution, please explain):

Tulane provides a herbarium with the necessary equipment (cabinets, dryers, etc.) and space to maintain it. Also, see below under 7.

6. Previous grants received for this or any research within the past five years (give amount and source): I have not received any previous grants devoted specifically to this project, but the National Science Foundation awarded grants for study and collection of steroid fungi in Costa Rica and Guatemala (1964-66; 1972-74) and in Mexico (1975-77). There are no grants now available for this work, but see under 7.

7. If you are applying elsewhere for a grant to be used during the same period as that of this request, so state and indicate whether for the same project; if not, state the difference: Senate Committee on Research, Tulane Univ.; Andrew Mellow Summer Fellowship administered by Center for Latin American Studies, Tulane Univ. These are alternative to this proposal.

8. Names and addresses of at least three individuals competent to pass judgment upon your project, to whom you will send the referee forms:

Dr. Bernard Lowy, Dept. Botany, Louisiana State Univ., Baton Rouge, La.

Dr. Robert Bandoni, Dept. Botany, Univ. of British Columbia, Vancouver, B. C., Canada

Prof. (emeritus) Joseph Ewan, Dept. Biology, Tulane Univ., New Orleans, La., 70118.

9. List publications by applicant with full bibliographical references (title, date, volume, and pages):

(if too many for this space, enter here publications relevant to this application, and send a complete bibliography for our office files) Because of space I have listed only the last five papers:

West Indian Species of Hymenochaete. Mycologia 59: 1034-1049. 1967 (with Fontaine Reeves); Lista Preliminar de los Hongos, Liqueenes y Mixomicetos de la Region de Uxpanapa, Coatzacoalcos, Los Tuxtlas, Papaloapan y Xalapa, etc. Bol. Soc. Mex. Mic. 12:59-102. 1978. (with G. Guzman) Same title except Segunda Lista. Bol. Soc. Mex. Mix. 13: 151-160. 1978 (with G. Guzman and L. Davalos); The Peniophoroid Fungi of the West Indies. Mycotaxon 10: 428-454. 1980 (with A. Punugu and M. T. Dunn); The Ethnomycology of Hueyapan, Morelos, Mexico. Jour. of Ethnopharmacology 2: 311-321. 1980 (with A. de Avila and G. Guzman)

Signature _____

*This page is to be used if additional information is considered necessary.
[Please typewrite on one side only.]*

For a number of years I have been concerned with the stereoid fungi, particularly those of Tropical America. Toward this end I have made a number of trips to Central America and the Lesser Antilles. Incidental collecting has revealed the rich diversity of the fungus flora of this region. There are a number of reports on different fungal groups of this region scattered in the literature. I am attempting to bring these reports together, check them against original collections, and compile a list which will eventually be incorporated into a manual similar to Denis' "Fungus Flora of Venezuela" (Kew Bull. Additional Series III. 1970). To this list will be added the collections at Tulane University which have been accumulating over the past several years. For this to be done properly, much more general collecting in the region is needed.

The importance of collecting of this type has been emphasized in a recent report of the National Research Council (Research Priorities in tropical Biology, 1980). The rapid alteration of tropical ecosystems makes it mandatory that these areas be analyzed ecologically with all due speed. Before an intensive analysis can be completed it is necessary to know the organisms and the roles they play in these ecosystems. A first step toward this goal is an inventory (with identification manuals) of the plants and animals. This proposal constitutes a first step toward such an end by dealing with one group (the larger fungi) of the region.

I have been in touch with one of the two Costa Rican mycologists and work in cooperation with a Mexican mycologist. Outside of Costa Rica I know of only one indigenous mycologist, and he is in El Salvador. In the U. S. only Prof. B. Lowy of Louisiana State University in Baton Rouge (retired but still active) has similar interests, and he is now engaged in work with South American fungi.

Arthur -

I hope this will help your cause.
If you have not already mailed your
proposal, correct the following:

P. 2, N^o 8 - Vancouver

P. 2, N^o 9 - ".... las Regiones....."

P. 3, P. 2 - mandatory 2/

Good luck,

Bernie

NATIONAL SCIENCE FOUNDATION

INFORMATION FOR REVIEWERS OF PROPOSALS

Mail reviews play a key role in the National Science Foundation's evaluation of the scientific merit of proposals. Please provide both written comments and a summary rating using the definitions provided.

WRITTEN EVALUATION

Quality of the Research

Be candid in your assessment of the proposed research; point out strengths and weaknesses in the approach and content of the proposal. Please comment on the originality and creativity of the proposed research. Be as specific as possible.

Qualifications of Principal Investigator(s)

Please comment on the principal investigator(s) recent research record or other evidence of research potential. Does the record suggest that the principal investigator(s) are likely to make an important and original contribution? Evaluate recent research accomplishments, or, especially for younger scientists, other evidence of potential.

Budget and Institutional Capability

Comments on the reasonableness of budget requests for particular items, such as instruments, computer time, research assistants, travel, and other factors, will be helpful. If appropriate, also comment on the research environment, including equipment, and other resources that are available to accomplish the proposed work.

SUMMARY RATINGS

On the basis of your written comments, please check one of the summary ratings. In making the selection, keep in mind both the quality of the proposal and the principal investigator(s)' recent research record.

Excellent: Probably will fall among top 10% of proposals in this subfield; highest priority for support. This category should be used only for truly outstanding proposals.

Very Good: Probably will fall among top 1/3 of proposals in this subfield; should be supported.

Good: Probably will fall among middle 1/3 of proposals in this subfield; worthy of support.

Fair: Probably will fall among lowest 1/3 of proposals in this subfield.

Poor: Proposal has serious deficiencies; should not be supported.

LENGTH OF PROPOSAL

Because scientists are increasingly concerned about the length of research proposals, the National Science Foundation is encouraging brief and concise proposals. The Foundation has established 15 single-space typewritten pages as a normal limit for the project description portion of research proposals. Somewhat greater length may be appropriate for proposals with multiple investigators or for proposals of unusual complexity.

CONFLICT OF INTEREST

If you have an affiliation or financial connection with the institution or the person submitting this proposal that might be construed as creating a conflict of interest, please describe those affiliations or interests in your own words on a separate piece of paper and attach it to your review. Regardless of any such affiliations or interests, unless you believe you cannot be objective, we would like to have your review. If you do not attach a statement we shall assume that you have no conflicting affiliations or interests.

CONFIDENTIALITY OF PROPOSALS AND PEER REVIEWS

The Foundation receives proposals in confidence and is responsible for protecting the confidentiality of

their contents. For this reason, please do not copy, quote, or otherwise use material from this proposal. If you believe that a colleague can make a substantial contribution to the review, please consult the NSF program officer before disclosing either the contents of the proposal or the applicant's name. When you have completed your review, either return the proposal to the program officer or destroy it.

Verbatim copies of reviews, ratings, and any other evaluative comments will be sent to the principal investigator/project director. The copies will *not* contain your name or the name of your institution, or names which might constitute an invasion of the privacy of others. Subject to this Foundation policy and applicable laws, including the Freedom of Information Act, 5 USC 552, and formal requests from chairpersons of Congressional committees having responsibility for NSF, your participation as a reviewer and the content of your review will be given the maximum protection from disclosure.

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NATIONAL SCIENCE FOUNDATION

WASHINGTON, D.C. 20550

NOV 28 1980

DR. BERNARD LOWY
DEPT OF BOTANY
LOUISIANA STATE UNIV
BATON ROUGE, LA 70803

Ref: Russo

The quality of the National Science Foundation's awards for research projects depends greatly on the critical judgments of expert reviewers. We hope you will help us to evaluate the research proposed in the enclosed material. Even if your speciality is not identical with that of the applicant, we would like to receive your review because general comments often provide a valuable perspective.

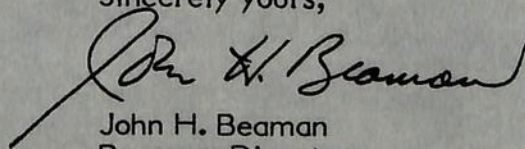
All comments that you care to make are welcome. However, we are especially interested in your (1) evaluation of the scientific quality and importance of the proposed research and (2) assessment of the capability of the applicant to make original and creative contributions to the scientific area represented by the proposed research. In responding to (1) special attention should be given to the significance of research objectives, feasibility of the experimental design, rigor of the hypotheses, and adequacy of data analysis. With respect to (2) recent accomplishments of the applicant, familiarity with related work, training, and institutional facilities should be taken into account. Although budgetary aspects should not influence your overall appraisal of the proposed project, budgetary comments will be useful.

"Information for Reviewers of Proposals" (NSF Form IA, printed on the reverse side of this letter) explains general evaluation criteria, provides guidance for avoiding conflicts-of-interest, and discusses protection of confidentiality. Please read the entire sheet and adhere to the rating scale described.

A rating sheet is enclosed, along with a preaddressed, franked envelope, for return to us by the date indicated. Please be sure to mark the summary rating at the bottom of the sheet. You may retain the bottom copy. Please remove the carbon paper before mailing. If a brief delay in responding is necessary, we prefer a somewhat late review rather than none at all. However, if you cannot review the proposal within a reasonable time, please notify me promptly and destroy the proposal.

Thank you for your help in making our proposal review process a judicious one.

Sincerely yours,



John H. Beaman
Program Director
Systematic Biology

Enclosures

PROPOSAL NO. DEB 8103493	INSTITUTION UNIVERSITY OF NEVADA RENO	PLEASE RETURN BY 12/25/80
PRINCIPAL INVESTIGATOR DON C. PRUSSO	NSF PROGRAM SYSTEMATIC BIOLOGY PROGRAM	

TULOSTOMA AND RELATED GASTEROMYCETES IN NEVADA

Comments (continue on additional sheet(s) as necessary)
Quality of the proposed research (including budget and institutional capability)

In a lengthy and detailed "Project Description" the author emphasizes the need for additional research on Tulostoma and related Gasteromycetes, and pleads the desirability of study abroad with an Argentine specialist to supplement the work. I do not doubt the validity and usefulness of such a study, but am not convinced that the author of this proposal is best qualified to undertake it. Research is not his forte, for he states that he has published nothing "in the last 5 years." Whatever may be the mitigating circumstances that account for this, it is difficult to evaluate potential research capability without a previously published research record. In view of the lack of such evidence, I believe that the relatively large outlay of funds requested for the project at this time is not justified.

Recent research achievements of the Principal Investigator(s)

None

OVERALL RATING ___ EXCELLENT ___ VERY GOOD ___ GOOD -X- FAIR ___ POOR

Verbatim but anonymous copies of reviews will be sent only to the principal investigator/project director. Subject to this NSF policy and applicable laws including the Freedom of Information Act 5 USC 552 and formal requests from Chairpersons of Congressional committees having responsibility for NSF, reviewers' comments will be given maximum protection from disclosure.

REVIEWER'S SIGNATURE

B. Lowy

REVIEWER'S NAME
DR. BERNARD LOWY
LOUISIANA STATE UNIV

OTHER SUGGESTED REVIEWERS (OPTIONAL)

FOR CONSIDERATION BY NSF ORGANIZATIONAL UNIT (Indicate the most specific unit known, i.e. program, division, etc.) Division of Environmental Biology		IS THIS PROPOSAL BEING SUBMITTED TO ANOTHER FEDERAL AGENCY? Yes ___ No <u>XX</u> ; IF YES, LIST ACRONYM(S):		
PROGRAM ANNOUNCEMENT/SOLICITATION NO.: NSF 78-41		CLOSING DATE (IF ANY): Nov. 3, 1980		
NAME OF SUBMITTING ORGANIZATION TO WHICH AWARD SHOULD BE MADE (INCLUDE BRANCH/CAMPUS/OTHER COMPONENTS) UNIVERSITY OF NEVADA, RENO				
ADDRESS OF ORGANIZATION (INCLUDE ZIP CODE) RENO, NEVADA 89557				
TITLE OF PROPOSED PROJECT The Study of <u>Tulostoma</u> and Related Gasteromycetes in Nevada.				
REQUESTED AMOUNT \$77,774.00	PROPOSED DURATION 2 years	DESIRED STARTING DATE June 1, 1981		
PI/PD DEPARTMENT Biology Department	PI/PD ORGANIZATION Univ. of Nevada		PI/PD PHONE NO. (702)784-6188	
PI/PD NAME DON C. PRUSSO	SOCIAL SECURITY NO.* 084-20-8952	DATE OF HIGHEST DEGREE ACHIEVED Ph.D. June 1963	MALE* XX	FEMALE*
ADDITIONAL PI/PD N/A				
ADDITIONAL PI/PD				
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FOR RENEWAL OR CONTINUING AWARD REQUEST, LIST PREVIOUS AWARD NO.:		IF SUBMITTING ORGANIZATION IS A SMALL BUSINESS CONCERN, CHECK HERE <input type="checkbox"/> (See CFR Title 13, Part 121 for Definitions)		
* Submission of SSN and other personal data is voluntary and will not affect the organization's eligibility for an award. However, they are an integral part of the NSF information system and assist in processing proposals. SSN solicited under NSF Act of 1950, as amended.				
CHECK APPROPRIATE BOX(ES) IF THIS PROPOSAL INCLUDES ANY OF THE ITEMS LISTED BELOW:				
<input type="checkbox"/> Animal Welfare	<input type="checkbox"/> Human Subjects	<input type="checkbox"/> National Environmental Policy Act		
<input type="checkbox"/> Endangered Species	<input type="checkbox"/> Marine Mammal Protection	<input type="checkbox"/> Research Involving Recombinant DNA Molecules		
<input type="checkbox"/> Historical Sites	<input type="checkbox"/> Pollution Control	<input type="checkbox"/> Proprietary and Privileged Information		
PRINCIPAL INVESTIGATOR/ PROJECT DIRECTOR	AUTHORIZED ORGANIZATIONAL REP.	OTHER ENDORSEMENT (optional)		
NAME DON C. PRUSSO	NAME JOHN E. NELLOR	NAME		
SIGNATURE	SIGNATURE	SIGNATURE		
TITLE Assoc. Prof. Biology	TITLE Dean, Graduate School Coordinator of Research	TITLE		
DATE	DATE	DATE		

81-03493

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NOTICE OF RESEARCH PROJECT
SCIENCE INFORMATION EXCHANGESMITHSONIAN INSTITUTION
NATIONAL SCIENCE FOUNDATION
PROJECT SUMMARYPROJECT NO. (Do not use
this space)

NSF AWARD NO.

1. NAME OF INSTITUTION (INCLUDE BRANCH/CAMPUS & SCHOOL OR DIVISION)

UNIVERSITY OF NEVADA, RENO

2. MAILING ADDRESS

RENO, NEVADA 89557

3. PRINCIPAL INVESTIGATOR AND FIELD OF SCIENCE/SPECIALTY

DON C. PRUSSO, MYCOLOGY

4. TITLE OF PROJECT

THE STUDY OF TULOSTOMA AND RELATED GASTEROMYCETES IN NEVADA

5. SUMMARY OF PROPOSED WORK (LIMIT TO 22 PICA OR 18 ELITE TYPEWRITTEN LINES)

The genus Tulostoma and related Gasteromycetous fungi are widespread throughout the state of Nevada, but have not been collected nor studied in this area although they are obviously important members of the arid ecosystem. Due to the relatively large number of individuals and large number of species encountered in three years of collecting, Nevada, and the Great Basin, is considered critical in Tulostoma studies. A taxonomic study is proposed in which extensive collection of specimens, recording of habitat data, and study of environmental factors will take place throughout the state over a two year period. Collection will take place systematically from Reno outward into the state. Identification of species will utilize morphological and microscopical characteristics, enhanced with SEM and gel electrophoresis where necessary. Correlations will be attempted between species distribution and plant communities and habitat types, and comparisons will be made with specimens collected in the Great Basin and Mohave Desert regions of Nevada. This study is seen as essential to continued research in the nutritional, symbiotic and developmental aspects of Tulostoma. The results will also enhance the study of Dr. Jorge Wright of Argentina, on the worldwide distribution of Tulostoma.

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PROGRAM

SECTION

PROPOSAL NO.

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START AND END DATES

AMOUNT GRANTED

NSF FORM 4 (7-78)

1. Proposal Folder 3. Division of Grants & Contracts 5. Principal Investigator 7. Assistant
2. Program Suspense 4. Science Information Exchange 6. Off. of Govt. & Pub. Progs. Director

PROJECT DESCRIPTION

The Organism

The genus Tulostoma was established by Persoon in 1794 based on two species, T. brumale (= Lycoperdon pedunculatum L.) and T. imbricatum (L. squamosum Mich.). Although Persoon, and later Fries (1829), used the spelling indicated above, some subsequent researchers beginning with Saccardo (1888) considered the spelling to be incorrect and adopted Tylostoma instead. White (1901), Lloyd (1906), and Long (1944), among others, followed Saccardo, but McAlpine (1895), Peck (1895), Cunningham (1925), and Wright (1955) use the original spelling, thus the use of two versions in this proposal.

Species of Tulostoma are commonly known as the stalked puffballs, since they consist of a somewhat spherical (if viewed from above) or hemispherical (if viewed from the side) peridium situated at the top of a stipe. They measure in length from 1 to 20 cm, and the peridium from 0.5 to over 2 cm in diameter. The stipe is usually completely buried in the soil, unlike the stipe that raises the pileus of a mushroom well above ground level. Less frequently the stipe is found protruding up to, but seldom exceeding, 50% of it's length above ground. The peridium is penetrated by a pore at maturity through which the spores (dry and powdery) are released. The basidiocarps are found either in small groups or singly and widespread, generally in open spaces between shrubs although some are found tucked under the canopy of the vegetation. Characteristically they occur in sandy soil, however some are found in a more clay-like habitat and one is reported as growing on wood. Worldwide, they number over 50 species and in the United States approximately 35 species have been identified. Because of the lack of keys to the numerous species, new species are being described without the benefit of the study of existing types, which is leading to a confusion of valid types and synonymy. Species of Tulostoma have been found on every major continent.

Brief Literature Survey

Since Persoon established the genus most of the literature on Tulostoma has been of a taxonomic nature reporting new species or the occurrence of existing species in new areas. Persoon listed two species but De Toni included 34 species world wide in Sylloge Fungorum (Saccardo 1888). Morgan (1890) reported 5 species that occurred in the United States, but two of these also were reported from Europe and one was later removed to a different genus. McAlpine (1895) considered the Australian species and, incidentally, was the only author to list common names for each species. New species found in the United States were reported by Peck (1895, 1896). The first significant study as concerns this proposal was that of V.S. White (1901) on North American species of Tylostoma. Miss White presented a key to 15 species (8 new) and described a total of seventeen. Shortly after that, Lloyd (1906) published a manuscript on the Tylostoma in the Lloyd Herbarium. It was not all-encompassing, but did include worldwide species, some of them new. Lloyd's work is a must for anyone studying the genus, but his descriptions were often incomplete, therefore it is necessary to observe his type specimens first hand to get valid characteristics. Further, Lloyd did not subscribe to the practise of including authors after the binomial so that at times it is difficult to tell who described what.

The Gasteromycetes of Australasia, authored by Cunningham (1925), contained a key to 12 species found in Australia and New Zealand. Coker and Couch (1928) included the genus in their treatment of the Gasteromycetes in portions of the United States and Canada. Major papers appeared during the 1940's when W.H. Long started publishing the results of extensive collecting in the southwest United States. Included in this series of publications (Long: 1944, 1946a, 1946b, 1947) were several new species, but Long died before he could publish a key to the United States Tulostomas. He did publish a key to the species in India (Long and Ahmad, 1947) and that was among his last publications.

Perhaps one of the most significant publications to appear was by Wright (1955) and concerned an evaluation of the specific characters of the genus. The publication is a milestone in the study of Tulostoma and presents a starting place for those interested in this organism. Moravec (Pilát, 1956) covered some of the European species and a key was included in his study. Shvartsman and Philimonova (1970) described 17 new species and reported the occurrence of others in Kazakhstan S.S.R. Wright, Herrera and Guzmán (1972) included three new species in a study of Tulostoma in Mexico and recently Liu (1979) from China and Oliver and Hosford (1979) from the Pacific Northwest published new species descriptions. There are, to be sure, other publications, but this survey serves to show the continuous addition of new species as new areas are collected, as well as the lack of comprehensive keys.

Publications dealing with studies other than taxonomic are rare. Tiffney, Jr. and Tiffney (1971) studied variation in the species T. brumale collected over a period of several years. Many papers report on habitat but often this consists of nothing more than a phrase or word (i.e., on sand, near sage). Long and Ahmad (1947) devoted a large section of their paper to habitat descriptions and ecological data for the Indian species. Wright sums up the present state in one of his letters when he said "another aspect that needs a better insight is their ecology. I have not done this at all, and very little appears in the literature." And later, "I have never been able to germinate the spores, but this certainly needs more investigation." In regards to a research project I discussed with him he replied "one sideline information that can be obtained is the developmental anatomy of spp. in those genera (Tulostoma, Chlamydomus, among others), which we badly need. Most of the biology of the Gasteromycetes is still unknown. Particularly interesting should be details of the development of peridia and stipes. Also, if feasible, cytological data on sporogenesis. (Indeed, you would need a team of workers in most of the chapters of biology!!!)."

Concerning the presence of Tulostoma in Nevada, a survey of collection data shows 4 collections from Nevada and 3 from adjacent Utah. The Nevada specimens merely state that they were collected "east of Elko" or just "Nevada". Wright considers Nevada to be a critical area for study of the genus and pinpoints the state as a void in our knowledge of this organism as well as most gasteromycetes.

The above discussion relies on comments by Wright in letters, rather than in publications, written to the Principal Investigator over the past few years. Wright is the acknowledged world authority on Tulostoma and has spent over 20 years studying the type specimens from around the world. My considerable correspondence with him was, in part, to assure myself that I would not duplicate his work, and also to exchange information. The exchange has been lopsided as his con-

experience and expertise resulted in each of his letters being a lesson in Tulostomology. He has been extremely uninhibited in sharing his knowledge and encouraging my studies. In return, I hope to share my future data and knowledge of the Great Basin fungi for his more extensive treatment of these organisms.

Species Identification

Persoon (1801) and Fries (1829) separated species based on the shape of the stipe, peridium, and mouth, but Fries also used the color of the gleba. In discussing two new species of Tulostoma, Peck (1895, 1896) included not only the morphology of stipe and peridium, but also measurements of those structures as well as spores and capillitium. He additionally considered septation and pigmentation of that structure. Mc Alpine (1895) used essentially the same characteristics as Persoon and Fries with no mention of spores and capillitium, but he did list habitat and substrate for each species.

The use of spore wall ornamentation was emphasized by White (1901) in her key to 15 Tulostoma species. Her initial separation in the key was based on the morphology of the mouth (i.e., entire, tubular, lacinate, raised, or plain), then separation was based on spore wall ornamentation. Capillitial structure was also considered in the key and in the species descriptions she lists the presence or absence of septa in that structure. Lloyd (1906) stressed the mouth as being the most important character and divided the species into five sections based on five distinct mouth types: 1) tubular - definite, round, often raised, 2) irregular - definite and elongate, often more than one mouth present, 3) torn - not definite and without fibrils, 4) fibrillose - fibrils surrounding the mouth and built-up on the peridium, 5) fimbriate - appearing fibrillose but fibrils arising from the edge of the peridium that forms the mouth. He placed little reliability on capillitium but did use spore ornamentation to separate species into groups within a mouth section.

Cunningham recognized three distinct mouth types (1925) that included those used by Lloyd. Type 1 was circular, definite, tubular, sometimes elliptical. Type 2 was circular, surrounded by hyphae. Type 3 was indefinite, plane or erumpent, resembling a rupture. Cunningham did mention a fourth group that he did not describe and merely referred to as "other types". After studying variation in the species T. pock-ulatum White, Cunningham eliminated peridial color and degree of roughness of the wall as valid characteristics. Additionally, he felt that ~~that~~ the size of the peridium had questionable use in taxonomy. He stated that "the spore markings are the most constant of all characters present in the genus, being the least variable", and in his key, initial separation was based on the spore wall with mouth characteristics used next.

Long (1944) stressed external morphology as most important and felt that previous workers had not utilized them sufficiently. Among the external structures he used were: 1) size - a plant 1-3 cm tall would never be 5-7 cm tall, 2) attachment of the stipe to the peridium - either the stipe was firmly attached or could easily be separated, 3) exoperidium - a. membranous, b. semi-membranous, c. granular, 4) color of the endoperidium - valid, but to be used with caution, 5) mouth types - tubular, fibrillose (with mat), fibrillose (without mat), and indefinite, 6) base of the stipe - radicating, bulbous or volvate and with various combination of these types. Later, Long (1946a) states "I find that spore markings are very unsatisfactory criteria for differentiating species, especially those from arid regions...". Long (1947)

(1947) mouth types he called valvate, subfibrillose and semi-tubular in addition to those named earlier. Long and Ahmad (1947) basically used those characters outlined by Long, however, a fourth exoperidial type (hyphal) and another mouth type, operculate, were added.

A critical review of all the characters mentioned above was undertaken by Wright (1955) and resulted in his listing the features of Tulostoma according to their relative importance in species identification. Mouth characteristics were placed first with top priority, and he identified three mouth-types: definite, either tubular or fibrillose, and indefinite. Spore characteristics were listed next and were divided into smooth or ornamented categories. Of the ornamented types, Wright found two series that were correlated with mouth types. One series ran from asperulate-verrucose-echinulate and were correlated with tubular mouths, while the other series ran from asperulate-verrucose-echinulate-reticulate-striate and was correlated with fibrillose mouths. As far as spore size was concerned, only two size ranges were considered; small (up to 4 microns) and large (5-7 microns). In his discussion of the capillitium, Wright regarded it with less relative importance having some constancy, but variability made its use less reliable. Of interest was his introduction of hyphal threads of the endoperidial wall which he found to correspond with capillitial type except for pigmentation. As for the endoperidium proper, he distinguished only light colored or dark colored. Exoperidial types were reduced to the two types, granular and membranous, and he points out the difficulty of identification of such types. Stipe characteristics were given less emphasis that had been done by previous researchers due, mainly, to the lack of critical study to account for variability. Finally, Wright distinguished two collar types (distant and close) and identified a membranous structure within the socket as either inconspicuous, distinct and simple, distinct and indented or distinct and pendant.

Very little significant work has appeared since Wright's critical study as the taxonomic papers published since then seem, for the most part, not to deviate from the established criteria.

Previous and Related Work

Initial interest in Tulostoma began with the discovery of a small collection of specimens made in 1950 and 1951, well documented and well preserved, stored in the Mycology laboratory. Attempts to identify them to species led to a search of the literature for an adequate key. It soon became evident that no recent key existed to the U.S. species, and White's 1901 publication did not contain at least some of these species. It also became evident that there were far more species described than were contained in White's key. The first task, then, seemed to be to compile a list of species and their descriptions in order to identify the Nevada specimens. Although simple enough on the surface, it became necessary to examine type specimens in order to have consistent data on all species so that a key could be constructed.

The Research Advisory Board of the University of Nevada, Reno, funded a proposal to visit the National Fungus Collection and to try preliminary work on electron microscopy of Tulostoma spores, while continuing collecting. The grant was for a one year period ending Dec. 31, 1979. Through that grant I was able to study a large number of the U.S. type specimens and, at present, I am in the process of trying to locate other type material. The data gathered, along with valuable information sent to me by Wright, is being used for the construction of preliminary keys.

Realizing that one of the big problems faced in constructing a

key will be dealing with invalid species and synonyms, other taxonomic tools were investigated including acrylamide disc electrophoresis. Utilizing the global mass, suspensions of spores and capillitium were ground in a fine mill and the resulting solution used for separation of total proteins. The results indicated the feasibility of using that method as well-defined bands appeared.

Scanning Electron Microscopy proved to be a very valuable aid. As pointed out by Wright (1955), spores fall into groups based on ornamentation. Early publications often contained poor or conflicting information on this characteristic, probably because of poor resolution of lenses or because of the small size of the spores, or both. Wright now uses SEM routinely since this technique leaves no doubt as to spore wall structure.

Attempts at TEM of spores were undertaken in hopes of studying wall formation. The preliminary work became a problem of material preparation as the tiny spores resisted conventional techniques. The problems centered around the moistening of the spores, infiltration of chemicals and plastic embedding. Most of the problems have been overcome and proper preparation is now reduced to ascertaining appropriate time increments for each step.

In 1978 a permanent research plot was established on the University of Nevada Field Station Land at the S-S Ranch in Wadsworth, Nevada, for continued field studies of Tulostoma and the "Tulostoma Community" (In my studies I have found several associated genera and when one is found, I usually find the others. These genera; Tulostoma, Disciseda, Montagnea, Chlamydomus and Geastrum, make-up the so-called community. Although this proposal primarily is concerned with Tulostoma, the other, and in fact any other, gasteromycetes will also be collected.). At the beginning of the Fall 1979 semester, a graduate student began work at the plot on development, seasonal appearance and ecology of Tulostoma, including a photographic record, soil analysis and laboratory work on spore germination.

Purpose of the Proposal

The purposes of this proposal all fall under a study basic to future work on the biology of Tulostoma. The present proposal concerns:

- a) Continued extensive collection of Tulostoma and the other gasteromycetes throughout the state of Nevada and, when feasible, portions of California, Idaho and Utah adjacent to Nevada and within the Great Basin.
- b) As collection occurs, to sample soil, identify plants and plant communities, and collect ecological data at all sites.
- c) Utilize morphological and microscopical characteristics to identify the collections and where necessary to apply biochemical techniques as well as SEM observation to help delineate species.
- d) To publish on the species of Tulostoma in Nevada, including a key to all species found in the United States.
- e) In the second year of the project to visit the laboratory of Dr. Jorge Wright, Argentina (as part of a proposed sabbatical leave) to study Tulostoma and related organisms. ✓

Significance of the Project

The significance of this proposal lies in the opportunity to

begin to understand a group of organisms that appear to be important members of the desert ecosystem. Tulostoma and the "Tulostoma Community" are widespread throughout these arid lands and make-up the majority of macroscopic fungi in sandy desert habitats. Their importance can only be a guess at this point as the extent of the underground mycelium, choice of substrate, interaction with vascular plants (i.e., mycorrhizal association), in summary, their role in the ecosystem, is unknown. Environmental impact studies repeatedly stress plants and animals, for obvious reasons, but virtually nothing is studied concerning the fungi, without which many plant species could not survive. Perhaps a great deal can be learned about these fungi without the knowledge of what species are present (the so-called "black box" idea), but since each species may play a different role, I believe a base line study of what is present, is necessary. Once that information is amassed, then a concentrated effort can be made to understand each species impact on the ecosystem.

Since Nevada has large numbers of these fungi, as evidenced by some of the collections of numerous specimens in concentrated areas, Wright feels that this area is critical to the study and understanding of their distribution. Both previously described and new species discovered in this study will be of value to Wrights efforts to understand worldwide distribution.

A single collection trip to Clark Co. resulted in the collection of Tulostoma specimens, which, as a whole, shows several differences when compared with Northern Nevada collections. These differences are ones of appearance (i.e., smaller size, predominantly a different mouth type, etc.). Long and Ahmad (1947) commenting on their Indian species, pointed out that the small size, predominance of one mouth type, etc., makes the Punjab collections unlike any seen in the United States. Long collected mainly in Texas, New Mexico and Arizona (portions of the Sonoran and Chihuahua deserts) and myc collections mainly have been in Northern Nevada (Great Basin), but the Clark Co. collection was in the Mojave desert, thus it becomes important to look for correlations of Tulostoma species with these different desert areas.

The proposed visit to Argentina to study with Wright is important, specifically and most directly to me, but it is also important to the study of these organisms within the United States. Nevada is not the only large area within this nation that lacks gasteromycete research. The only previous area where concentrated collection occurred was the southwest, Long's territory. There are no experts on Tulostoma in this country, and knowledge of worldwide species, United States species, and even regional species, is lacking. By studying with Wright I would hope to fill the vacancy in expertise on these organisms. It is possible to accumulate the knowledge without direct contact, but several weeks work with Wright would undoubtedly provide the pertinent information he took twenty-plus years to accumulate. Duplication of 20 years of study to the goal of getting the same information is wasteful.

Methods and Materials

Collecting: Continued collecting has been in progress since 1978 and takes place whenever time permits and opportunities arise. Most collection has been within a 60 mile radius of the University Campus, although there still are areas within that radius to be covered. Collection will proceed outward from Reno in an ever increasing circle. Spot collections, such as a two day visit to Clark Co., will be taken when possible, even though they are not within the systematic scheme of collecting. Initially, a one time canvas of the state is the main goal, but in the future, areas will be visited seasonally. The simplicity of collecting Tulostoma and the other genera makes them ideal organisms

for field collection. The only problem encountered is one of finding them since their small size and partial covering by desert soils makes their discovery a very slow, tedious, foot-by-foot process, especially if they occur under the canopy of the shrubs. Unlike many mushroom-like organisms, however, they do not decay readily and persist for long periods of time in the field. Specimens freshly collected in 1978 could not be distinguished from those collected at the identical site in 1951 and were they to be mixed, they could not be separated. Collection requires no special techniques either initially or for subsequent storage. Specimens will be picked-up in the field, placed in small paper or plastic bags with appropriate data and returned to the laboratory where they will be placed in boxes and given permanent collection numbers. They will then be placed in the Mycological Collection awaiting identification.

Collection trips will vary, both in distance and in time. During the academic year the trips will be necessarily of shorter duration and closer to the University, probably ranging between 100 miles round trip and two hundred miles round trip. During the summer vacation months the trips will be more extensive hitting the farther areas and lasting up to 6-8 days. In figuring the budget for this proposal an average of three days was considered realistic. Also, as explained in the budget justification, for budget purposes the average trip is considered to be 300 miles round trip. As pointed out above, collecting in an area requires foot-by-foot coverage, but this should not imply that the entire square footage of the state need be covered in this way. There are certain habitats where these fungi are not found and large sections can be eliminated. The more likely sites will be considered first, less likely sites next, and those considered to be long shots will be visited only briefly to substantiate the lack of specimens.

In each habitat type yielding the fungi, specimens of the vascular plants will be collected, pressed, identified, and deposited in the University of Nevada Herbarium as reference material. As the study progresses and both fungi and habitat types are identified, attempts will be made to correlate the two.

Soil samples will be taken from each site and these will consist of the top 20 cm collected in 5 cm increments, placed in standard soil bags supplied by the Soil Testing Laboratory of the University. Properties to be analysed will include: water holding capacity, particle size, total organic matter, pH, inorganic content.

There will be no attempt to gather climatic data at each site as this would present overwhelming problems. Instead, such data will be taken from the records of the nearest governmental weather station. the use of this information will have to be determined after critical study.

Identification: Whereas collecting will necessarily take place during periods of fair weather and adequate time intervals, identification will take place during inclement weather and when teaching duties prevent trips to the collecting areas. When possible, gross morphological and conventional microscopical characteristics will be used for species identification following, essentially, Wright's guidelines. These guidelines are being adhered to in constructing the key to be used. Naturally, there are some items where we have minor disagreement and I will employ my own concepts on these points. As each collection is identified, duplicates will be sent to Dr. Wright, both for his collection and study and for verification. If material is sufficient, specimens will also be sent to the National Fungus Collection and the New York Botanical Garden.

The use of other aids toward species identification will be employed, namely electrophoresis and SEM. Still other valid methods, such as hyphal fusion tests, cannot be employed until the problem of spore germination is overcome.

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Seminars or papers presented:

The Gasteromycetes of Nevada. Biology Colloquim, UNR
Tulostoma of Nevada. Univ. of Calif., Davis

Papers in Progress:

Unusual Chlamydomonas from Nevada.
Two Species of Battarrea from Nevada.

Research in Progress:

Study of Tulostoma and Related Genera in Nevada
Fungi in the Digestive Tract of Sand Beetles, with
Dr. Richard Rust, Univ. of Nevada

Grants or Financial Support in last 5 years:

Support from Coll. of Agr., UNR to study Chalkbrood Disease
in the Alfalfa Leafcutter Bee, Summer 1978

Research Advisory Board, Univ. of Nevada. Tulostoma in
Nevada.

SUMMARY
PROPOSAL BUDGET

				FOR NSF USE ONLY	
ORGANIZATION AND ADDRESS				PROPOSAL NO.	
UNIVERSITY OF NEVADA (Biology Department)					
RENO, NEVADA 89557				DURATION (MONTHS)	
PRINCIPAL INVESTIGATOR/PROJECT DIRECTOR				PROPOSED	REVISED
DON C. PRUSSO					
NSF USE	A. SENIOR PERSONNEL (LIST BY NAME; SHOW NUMBERS OF PEOPLE IN BRACKETS; SALARY AMOUNTS MAY BE LISTED ON SEPARATE SCHEDULE) GPM 205.1b	NSF FUNDED MAN MONTHS		FUNDS REQUESTED BY PROPOSER	FUNDS GRANTED BY NSF (IF DIFFERENT)
		CAL.	ACAD. SUMR.		
	1. P.I./P.D. DON C. PRUSSO		4	\$ 11,242	\$
	2. CO P.I./P.D.			\$	\$
	3. CO P.I./P.D.			\$	\$
	4. CO P.I./P.D.			\$	\$
	5. CO P.I./P.D.			\$	\$
11115	6. (/) ← SUBTOTALS A1 - A5 →		4	\$ 11,242	\$
	FACULTY AND OTHER SENIOR ASSOCIATES (ATTACH EXTRA SHEET IF NECESSARY)			\$	\$
	7.			\$	\$
	8.			\$	\$
	9.			\$	\$
	10.			\$	\$
	11.			\$	\$
11117	12. () ← SUBTOTALS A7 - A11 →			\$	\$
	B. OTHER PERSONNEL (LIST NUMBERS IN BRACKETS)			\$	\$
11141	1. () POSTDOCTORAL ASSOCIATES			\$	\$
11149	2. () OTHER PROFESSIONALS			\$	\$
11150	3. (/) GRADUATE STUDENTS			\$	\$
11152	4. (/) UNDERGRADUATE STUDENTS			\$ 11,040	\$
11182	5. () SECRETARIAL - CLERICAL N/A			\$ 5,780	\$
11183	6. () TECHNICAL, SHOP, OTHER			\$	\$
	TOTAL SALARIES AND WAGES (A+B)			\$ 28,062	\$
11200	C. FRINGE BENEFITS (IF CHARGED AS DIRECT COSTS) 2% of A+B			\$ 562	\$
	TOTAL SALARIES, WAGES AND FRINGE BENEFITS (A+B+C)			\$ 28,624	\$
	D. EQUIPMENT (LIST ITEMS AND DOLLAR AMOUNTS FOR EACH ITEM)				
	1 Zeiss Automatic camera attachment for Zeiss research microscope \$6,600				
	1 #461910 Planachromat 100/1.25 oil, Zeiss lens 650				
23181	TOTAL EQUIPMENT			\$ 7,250	\$
	E. MATERIALS AND SUPPLIES Photographic supplies for field photography, light microscopy and electron microscopy, electrophoresis chemicals, glassware, specimen boxes, etc.			\$ 3,600	\$
32630					
42111	F. DOMESTIC TRAVEL please see attached itemized list and justification.			\$ 11,366	\$
42112	G. FOREIGN TRAVEL (LIST DESTINATION AND AMOUNT FOR EACH TRIP; GPM 731) Please see attached justification. Roundtrip airfare to Buenos Aires, Argentina to visit the laboratory of Dr. J.E. Wright approx. \$1600. Living expenses and transportation in Argentina approx. \$2400.			\$ 4,000	\$

University of Nevada, Reno, Nevada 89557
 Don C. Prusso PI/PD

	Year 1	Year 2
A.1 Don C. Prusso PI 2 mos. sum.	\$ 5457	\$ 5785
B.3 Graduate student	5400	5640
4 Undergraduate	2780	3000
Total Salaries and Wages	13637	14425
C. Fringe Benefits @ 2%	273	289
Total Salaries, Wages, F.B.	13910	14714
D. Equipment	7250	-----
E. Materials and Supplies	2100	1500
F. Domestic Travel		
Collecting	3408	3408
Natl. Fungus Coll., Beltsville and other herbaria	1700	850
Meetings	1000	1000
Total Domestic Travel	6108	5258
G. Foreign Travel	-----	4000
H. Publication charges	350	350
I. N/A		
J. N/A		
K. N/A		
L. Other Direct Costs		
1. Charges for E.M. facilities		
Univ. of Calif., Davis	1200	1200
2. Tuition and Reg. fees	1300	1300
M. Total Direct costs	31868	28672
N. Indirect Costs		
34% of Direct costs minus D and L2	7928	9306
O. Total Costs	39796	37978

Item F. Domestic Travel

In trying to estimate total mileage for travel in collecting, an average trip of 300 miles (roundtrip) was used. I arrived at this figure arbitrarily, but based on the following:

Univ. Of Nevada, Reno is 12 miles from the western border with California.

UNR to Austin..centrally located.....	340 mi	Roundtrip
UNR to Ely.....on eastern border with Utah..	634 mi	" "
UNR to Winnemucca..north central Nevada.....	328 mi	" "
UNR to Tonopah..south central Nevada.....	472 mi	" "
UNR to Caliente..south eastern border/Utah...	886 mi	" "
UNR to Las Vegas..souther tip of Nevada.....	852 mi	" "
UNR to Fallon..limit of general area colk. to date.....	120 mi	" "

Three hundredmiles roundtrip seemed to be a conservative, yet realistic, figure.

Cost of travel was estimated as follows:

Average of 2 trips per month or 24 trips per year at 300 mi per trip.....	7,200 miles
7,200 miles at 17¢/mi....	\$1,224
Vehicle charge of \$5/day	360
Meals:72 days @\$18/day	1,296
Lodging:Avg 1 night/trip @ \$22	528
Total	\$3,408

Item G. Foreign Travel

Although other granting agencies will be approached for funding of a visit to Dr. Wrights laboratory in Argentina, I am also including the cost as part of the budget. Should other funding materialize, I will contact NSF. In previous correspondence Dr. Wright has indicated his willingness to have me visit his laboratory as part of a proposed sabbatical leave. My work in Nevada would be of great interest to him, and his knowledge of Tulostoma would be of utmost importance to me. I have been at UNR for 15 years with no sabbatical leave to date. I believe my proposal for a leave would be well-received, and if granted, would spend 2 months of a 6 month sabbatical with Dr. Wright. The benefit to me cannot be measured, but would surely enhance my studies of Tulostoma, not only in Nevada, but eventually throughout the Great Basin.

Item L.1 I have arrangements with the Botany Department, University of Calif., Davis, to use their electron microscope facilities at the rate of \$100/day. I anticipate use of the microscopes at 1 day/month (usually $\frac{1}{2}$ day, twice a month).

CURRENT AND PENDING SUPPORT

- I. Don C. Prusso
A. Current Support NONE
B. Proposals Pending
1. The Study of Tulostoma and Related
Gasteromycetes in Nevada NSF, \$77,774.00
Jun 1981-Jun1983
20% Acad.
100% Sum.
State of Nevada and
Univ. of Nevada, Reno
2. NONE
3. NONE
- II. NONE
- III. Transfer of Support NONE
- IV. Has not and Will not be submitted elsewhere

I will be involved in research on food found in the digestive tracts of desert beetles with Dr. Richard Rust, Biology Dept. Univ. of Nevada, Reno, to the extent of approx. 1 hr. per week during the next 6 months. This project should be completed before this proposal is considered.

FACILITIES

With the exception of the electron microscopes, all of the necessary equipment and space described in this proposal are available for use by the principal investigator. A Zeiss research microscope equipped with phase contrast optics as well as 10x and 40x brightfield objectives has been assigned to the principal investigator. Recently, this microscope was equipped with a Zeiss halogen illuminator for more efficient light. It's capabilities can be enhanced by the addition of a Zeiss automatic camera attachment and a quality brightfield, 100x oil immersion lens. Also included in the space allotted to the principal investigator is an MRA model 130 Acrylamide Gel Electrophoresis unit with power supply. Electron microscope facilities are available at the University of California, Davis campus. Other minor equipment present in the Biology Dept., UNR include autoclaves, pH meters, incubators, sputtering devices, dissecting microscopes and sufficient bench space and specimen storage space.

SPECIAL CONSIDERATIONS

This proposal does not:

1. include research with actual or potential impact on the environment
2. include research in a foreign country
3. include research in the Antarctic
4. include research at a registered historic or cultural property
5. include research involving the use of recombinant DNA
6. include research involving the use of human subjects, hazardous materials, laboratory animals, marine mammals, or endangered species.

PROPOSAL NO. DEB-7917926	INSTITUTION UNIV OF TENN AT KNOXVILLE	PLEASE RETURN BY
PRINCIPAL INVESTIGATOR PETERSEN RONALD H		NSF PROGRAM SYSTEMATIC BIOLOGY PROGRAM
TITLE DOCTORAL DISSERTATION RESEARCH IN SYSTEMATIC BIOLOGY		

COMMENTS (CONTINUE ON ADDITIONAL SHEET(S) AS NECESSARY)

Mr. Mueller's proposal falls well within the criteria established by the Directorate for "improving doctoral dissertation research." It is carefully planned and organized and is concerned with substantial taxonomic and related problems in agaricology that eventually need to be resolved. The project emphasizes basic research, but its findings may also contribute to some practical aspects of forestry. Coordination of the field and laboratory work outlined is effectively designed to yield significant results, and Mr. Mueller's earlier research with Laccaria should adequately qualify him to amplify that study.

The candidate will have the considerable advantage of being able to profit from the guidance of two outstanding teachers and researchers, Drs. Petersen and Miller, and this, together with his competence and strong motivation (referred to in Dr. Sundberg's letter), mitigate in favor of the writing of a dissertation of high scientific merit. In my judgment, approval of support for this project would be a modest investment toward the encouragement of a research worker of some promise.

In view of the continually rising cost of living, the 2-year proposed budget seems quite reasonable.

Since this study excludes Mexico, I would suggest that the phrase "north of Mexico" be added to the title of the project.

RATING: EXCELLENT VERY GOOD GOOD FAIR POOR

Verbatim but anonymous copies of reviews, ratings and associated correspondence will be sent only to the principal investigator/project director on request. Subject to this NSF policy and applicable laws, including the Freedom of Information Act, 5 USC 552, reviewers' comments will be given maximum protection from disclosure.

REVIEWER'S SIGNATURE <i>B. Lowy</i>	REVIEWER'S NAME (TYPED) Dr. Bernard Lowy
OTHER SUGGESTED REVIEWERS (OPTIONAL)	

REVIEWER'S COPY

Retuned 12-VII-1979

NATIONAL SCIENCE FOUNDATION

WASHINGTON, D.C. 20550

July 2, 1979

Dr. Bernard Lowy
Department of Botany
Louisiana State University
Baton Rouge, Louisiana 70803

REF: DEB-7917926

Dear Bernard:

The quality of the National Science Foundation's awards for research projects depends greatly on the critical judgments of expert reviewers. We hope you will help us to evaluate the research proposed in the enclosed material. Even if your speciality is not identical with that of the applicant, we would like to receive your review because general comments often provide a valuable perspective.

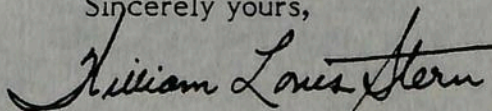
All comments that you care to make are welcome. However, we are especially interested in your (1) evaluation of the scientific quality and importance of the proposed research and (2) assessment of the capability of the applicant to make original and creative contributions to the scientific area represented by the proposed research. In responding to (1) special attention should be given to the significance of research objectives, feasibility of the experimental design, rigor of the hypotheses, and adequacy of data analysis. With respect to (2) recent accomplishments of the applicant, familiarity with related work, training, and institutional facilities should be taken into account. Although budgetary aspects should not influence your overall appraisal of the proposed project, budgetary comments will be useful.

"Information for Reviewers of Proposals" (NSF Form 1A, printed on the reverse side of this letter) explains general evaluation criteria, provides guidance for avoiding conflicts-of-interest, and discusses protection of confidentiality. Please read the entire sheet and adhere to the rating scale described.

A rating sheet is enclosed, along with a preaddressed, franked envelope, for return to us by the date indicated. Please be sure to mark the summary rating at the bottom of the sheet. You may retain the bottom copy. Please remove the carbon paper before mailing. If a brief delay in responding is necessary, we prefer a somewhat late review rather than none at all. However, if you cannot review the proposal within a reasonable time, please notify me promptly and destroy the proposal.

Thank you for your help in making our proposal review process a judicious one.

Sincerely yours,



William Louis Stern
Program Director
Systematic Biology

NATIONAL SCIENCE FOUNDATION
WASHINGTON, D.C. 20550

Directorate for Biological, Behavioral, and Social Sciences

**DIVISION OF ENVIRONMENTAL BIOLOGY
DIVISION OF BEHAVIORAL AND NEURAL SCIENCES
DIVISION OF SOCIAL SCIENCES**

Grants for Improving Doctoral Dissertation Research

Grants are awarded in support of doctoral dissertation research in the environmental, behavioral, neural, and social sciences in order to improve the overall quality of dissertation research in these sciences. The grants allow doctoral candidates opportunities for greater creativity in the gathering and analyzing of data than would otherwise be possible. Proposals are judged on the basis of scientific content, importance, and originality. Dissertation proposals compete for research grant funds with proposals for regular research projects. Awards will be made only when it is clear that the dissertation to be produced will be of the highest scientific merit.

The grants are intended to provide funds for items not normally available from the student's university or other sources. Allowable items include travel to specialized facilities or field research locations, sample survey costs, specialized research equipment and services not otherwise available, supplies, microfilms and other forms of unique data, payments to subjects or informants, rental of environmental chambers or other research facilities, and computer time only when not available at the institution. A request for per diem allowance for time away from a home base to conduct research should be carefully justified in terms of living costs in excess of those in the vicinity of the home base.

Funds may not be used as a stipend for the student, for tuition, or for dependents of students. Textbooks and journals cannot be purchased with dissertation research grant funds, and funds may not be used for typing or reproduction of the student's dissertation. In special circumstances and with special justification, funds may be requested for research assistants.

Who May Submit:

A proposal should be submitted through regular university channels by the dissertation advisor on behalf of a graduate student who is at the point of initiating dissertation research. A proposal may be submitted while the student is completing other requirements for the doctorate. Only students enrolled at U.S. institutions are eligible. Academic departments should limit the applications submitted to outstanding dissertation proposals with unusual financial requirements that cannot be met by the university.

Contents of the Proposal:

The proposal should have the same format as proposals by faculty members for support of their own research (see *Grants for Scientific Research*, NSF 78-41). A 200-word project summary of the proposed research, suitable for publication, is required. The main

body of the proposal should not exceed eight single-spaced typewritten pages and should include a: (a) description of the scientific significance of the work and the design of the project in sufficient detail to permit evaluation; (b) presentation and interpretation of progress to date if the research is already underway; (c) statement of the items for which funds are requested and their estimated costs with an explanation of their necessity for the research; and (d) schedule for the research including the date funds will be required.

Biographical data should be included for the student and for the dissertation advisor, including educational background, training, and experience directly relevant to the dissertation, together with a list of other financial aid received, applied for, or anticipated during the award period. Transcripts are not required, but lists of relevant courses and grades may be included. Statements from faculty members or other references concerning the student are optional. If survey questionnaires or interviews are to be used, the proposal should contain a copy of the questionnaire, if available, or sample questions, and information on who will conduct the interviews.

Submission Procedures and Grant Administration:

Proposals should be submitted by the university to the Central Processing Section, National Science Foundation, Washington, D.C. 20550. Six copies of doctoral dissertation research proposals are necessary, one of which should be signed by the student, the dissertation advisor, and an official authorized to sign for the university. Formats for the cover page, project summary, and summary proposal budget are contained in the appendixes of *Grants for Scientific Research*. Proposals may be submitted at any time. Up to 6 months should be allowed for normal processing. The Foundation's decision will be announced as promptly as possible.

Awards will be made to the institution with the student's dissertation advisor designated as "project director." Grants will be awarded for periods up to 24 months. The grant is to be administered in accordance with the applicable policies and procedures contained in the *NSF Grant Policy Manual* (NSF 77-47). *Grants for Scientific Research* (NSF 78-41) summarizes the salient provisions of interest to the project director and to the student. A final project report (in the general format of Appendix VI to NSF 78-41) is required within 90 days after the expiration of the grant. A copy of the dissertation abstract or other publication deriving from it may be submitted with the final project report. NSF does not reimburse grantee institutions for the indirect costs associated with doctoral dissertation research and considers this as satisfaction of the cost-sharing requirement.



Southern Illinois
University at Carbondale
Carbondale, Illinois 62901

Department of Botany

March 20, 1979

Program Director
Predoctoral Research Grants
National Science Foundation
Washington, D.C.

Dear Sir:

I am pleased to write this letter in support of Mr. Gregory Mueller's application for National Science Foundation research funds. As supervisor of Greg's Master's degree program and thesis research for two years (1976-1978) at Southern Illinois University, I came to know him well and feel that he will make a real significant contribution.

Greg's proposed project, The Genus Laccaria (Agaricales, Basidiomycetes, Fungi) in North America, is an example of the kind of basic comprehensive treatment sorely needed for most genera of North American mushrooms. Although our understanding of the biology and potential importance of nutrient recycling and mycorrhizae in reforestation and other industrial forestry practices is rapidly advancing, our knowledge of the systematics of the fungi involved lags far behind. (And, because of the recent nationwide emphasis on cellular and subcellular research, comparatively few workers are being trained to help overcome this deficiency.)

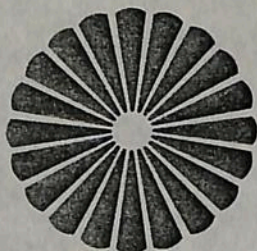
In spite of the fact that the genus Laccaria is cosmopolitan, only the most common species are readily identifiable, even by practicing specialists in basidiomycete taxonomy. The problems thus created in studying (and effectively communicating about) fungal ecology, mycorrhizal associations and related forest ecology where Laccaria is involved are obvious.

Greg is a highly motivated student well qualified to carry out the proposed project. His Master's degree research problem, a well executed study of Laccaria in southern Illinois, provided a vehicle for initial development of the skills and techniques necessary for carrying out this project effectively. Likewise, it provided insight on many of the biosystematic problems in Laccaria in need of attention. Further, during past months, Greg has further developed his capabilities via formal studies in mycological systematics with Dr. Ronald Peterson and in associated techniques employed in beta taxonomy (e.g., gel electrophoresis).

With such preparation, I strongly feel that Greg's research will result in a contribution useful to all--mycologists and foresters alike.

Sincerely,

Walter J. Sundberg
Associate Professor



DEPARTMENT OF BOTANY
THE UNIVERSITY OF TENNESSEE
KNOXVILLE, TENNESSEE 37916 / USA / TEL. (615) 974-2256

March 12, 1979

Dear Program Director:

The attached proposal has been carefully examined by me and has my full endorsement as Mr. Mueller's major professor. The genus Laccaria is significantly important taxonomically, for its taxa are widespread and abundant, although very imperfectly understood. Ecologically (and potentially economically), because the mycelium is known to associate in mycorrhizal relationships, the genus will be under close scrutiny for use in nurseries and reforestation programs.

Mr. Mueller arrived here in September 1978, and we immediately spent three weeks in the field together in Nova Scotia. During that experience and thereafter, he has proven his industriousness, and I fully expect him to complete his Ph.D. degree on schedule. I recommend him and this proposal without reservation.

Sincerely,

Ronald H. Petersen
Professor

RHP:mer

79-17926

DOCTORAL DISSERTATION IN ENVIRONMENTAL BIOLOGY
RESEARCH PROPOSAL SUBMITTED TO THE NATIONAL SCIENCE FOUNDATION

by

The University of Tennessee,
Knoxville, Tennessee

Principle Investigator:

Mr. Gregory M. Mueller
Department of Botany
University of Tennessee
Knoxville, Tennessee

Project Director:

Dr. Ronald H. Petersen
Department of Botany
University of Tennessee
Knoxville, Tennessee

Title: The genus Laccaria (Agaricales, Basidiomycetes,
Fungi) in North America.

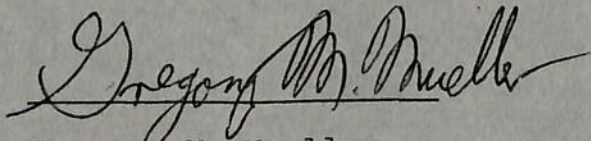
New request to NSF

Proposed starting date: September, 1979

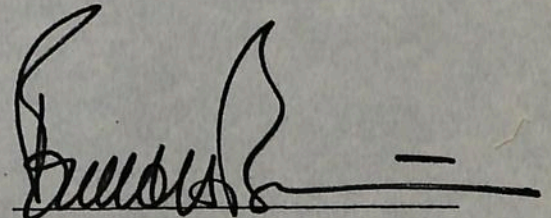
Proposed duration: 24 months

Amount requested: \$6,916

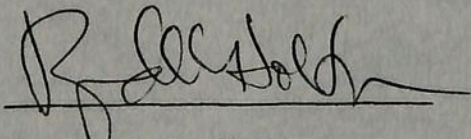
Endorsements:



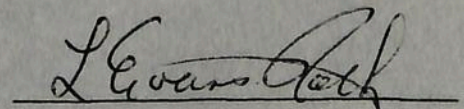
Gregory M. Mueller
GTA, Botany
University of Tennessee
(615) 974-2256



Ronald H. Petersen
Professor of Botany
University of Tennessee
(615) 974-2256



Raymond W. Holton
Head, Department of Botany
University of Tennessee
(615) 974-2256



L. Evans Roth
Vice Chancellor for
Research & Graduate
Studies
University of Tennessee
(615) 974-3466

Abstract

Laccaria Berk. & Br. is a cosmopolitan genus of mushrooms (Agaricales) collected frequently throughout North America. Its ecological importance is due to expidition of nutrient cycling ^{expediting} through decomposition, and the formation of mycorrhizal associations with many species of plants.

Due to the lack of type specimens for several taxa in Laccaria, its phenotypically plastic nature, and several nomenclatural problems, identification of and correct names for several species are in doubt, and controversy over the number of taxa in the genus remains. Additionally, knowledge of distribution patterns in Laccaria, its associations with higher plants, and its intra- and interspecific variation is limited and fragmentary. To rectify these problems, a biosystematic examination of the species of Laccaria found in North America is proposed.

Extensive field collecting of Laccaria from selected locations in the United States and Canada will be conducted from Spring, 1979, through Fall, 1981. Field collecting is essential in order to obtain fresh material for initiation of tissue cultures, for observations of phanerogamic associations, and for morphological descriptions. Besides alpha taxonomic studies, various beta taxonomic techniques will be attempted including SEM examination of basidiospores, genetic studies, electrophoretic analysis of enzyme patterns, pigment analysis, and cultural studies. Interpretation of results will be accomplished by standardized statistical methods utilizing the digital computer.

History and justification: Berkeley & Broome proposed Laccaria in 1883, to accommodate the species of Agaricus subgenus Clitocybe which exhibited thick gills and globose spores. Proposed for transfer to the new genus were Agaricus laccatus Scopoli ex Fries, A. bellus Persoon ex Fries, and several unnamed species from Ceylon and Europe. No new combinations were made, however, until the following year when Cooke (1884) formally transferred eight species to the genus. g/

Although most modern workers consider Laccaria to be an autonomous genus, easily distinguishable from other members of the family Tricholomataceae (McNabb, 1972; Singer, 1975), delimitation of its species is difficult. The primary problem has been the lack of a type specimen for the type species of the genus, L. laccata (Scopoli ex Fries) Berkeley & Broome. Malençon (1966) discussed the fallacy of segregating species and subspecies from L. laccata when, without typification, the delimiting characters are unavoidably imprecise and changeable. This problem was partially rectified by Singer's (1967) designation of a lectotype-totype collected in 1964, at Femsjö, Sweden. Though such typification should help alleviate discrepancies inherent in previously described species and clarify concepts, no major reevaluation of species of Laccaria has appeared.

In addition, interpretation of existing species descriptions is often hampered because it is sometimes unclear whether or not the basidiospore size data includes ornamentation (Singer, 1967; McNabb, 1972). These factors and the phenotypically plastic nature of L. laccata sensu lato make identification of some species difficult at best (e.g., Smith, 1949; Miller, 1972).

Although Laccaria is a commonly collected genus throughout North America, our knowledge of the classification and biology of the group is limited and fragmentary. There are approximately 40 names attributed to Laccaria. The reportedly wide geographical range of some taxa, however, indicate that there is likely to be extensive synonymy as well as new taxa (McNabb, 1972). Singer (1975) recognized only 17 clearly diagnosed species in the genus. Such discrepancies in species number will remain until modern monographic and type studies are carried out on all described taxa, nomenclatural problems rectified, and an intensive investigation of collections obtained from the field and herbaria is completed. d/

Laccaria reportedly forms mycorrhizal associations with a wide range of vascular plants, including several economically important tree species (Trappe, 1962). Likewise, Laccaria plays an important role in forest succession (Singer & Moser, 1965; Singer, 1971). The fact that Laccaria is a facultative ectomycorrhizal fungus, and thus easier to grow in pure culture than obligate mycorrhizal fungi (Hasckaylo, 1953; Singer, 1975; Stack, et al., 1975; Trappe, 1977), makes the genus a good candidate for cultural studies on the biology of mycorrhizae and related subjects. In addition, with the increasing need and practice of inoculating nurseries with mycorrhizal fungi (Trappe, 1977), mycorrhizal associates which readily form mycelium in culture will become more significant. It becomes increasingly important, therefore, to understand the biology, phanerogamic affinities, and infraspecific variation in Laccaria. m/

Previous research: A preliminary floristic treatment of Laccaria was carried out during my master's degree program at Southern Illinois University at Carbondale. My thesis research entitled "The genus Laccaria in southern Illinois" (Mueller, 1978) entailed both alpha and beta taxonomic techniques. A synopsis of the results follows.

Studies of material obtained from field collections and from cooperating herbaria revealed that the genus Laccaria forms a conspicuous part of the agaric flora of southern Illinois. As presently circumscribed, six species of the genus occur in the study area. No species-specific association with higher plants could be determined.

Attempts were made to segregate species based on standardized characters of somatic cultures following the techniques of Nobles (1965) and Campbell & Petersen (1975). Although noticeable differences existed between cultures of the various isolates, more work was needed before data derived from this technique could significantly effect species circumscriptions in Laccaria.

Mycelium obtained by tissue culture of Laccaria spp. failed to produce basidiocarps in any of the attempted treatments. However, a purchased isolate of L. laccata (ATCC 24509), cultured with those obtained from the natural habitat, readily produced basidiocarps on two of the tested agar media. It should, therefore, be feasible to obtain basidiocarps of Laccaria under controlled environmental conditions if additional isolates are utilized in addition to slightly modifying the employed techniques.

Attempts to germinate basidiospores of Laccaria proved futile. Lack of germination was probably caused by the interactions

of several factors including the age and number of the spore collections used and the techniques employed. Fries (1977) reported that basidiospores of Laccaria remained viable for a maximum of 3 months. He also showed that in some related genera, viability of the basidiospores varied considerably from basidiocarp to basidiocarp (Fries, 1976). Additionally, my interpretation of the techniques employed by Fries (1977) in his successful germination of L. laccata basidiospores was shown to be in error when he later published a detailed account of his methods (Fries, 1978). Therefore, further experimentation using fresh basidiospores obtained from a large number of basidiocarps, utilizing the methods clarified by Fries (1978) would potentially yield more positive results.

Scanning electron microscope studies of basidiospores from several Laccaria species revealed distinct reticulations at the base of every spine. These reticulations were not reported by Bigelow & Rowley (1968) who utilized the surface replication technique. In both studies the basidiospores were air dried and not fixed. In order to more critically analyze the surface structure of the spores at the SEM level for potential taxonomic use, fixed material should be studied.

Proposed research: In order to arrive at a stable delimitation of species in Laccaria, a biosystematic study utilizing both alpha and beta taxonomic techniques will be attempted.

Extensive field collecting of Laccaria from selected locations in the United States and Canada will be conducted from Spring, 1979 through Fall, 1981. Field collecting is essential not only to obtain fresh material for morphological descriptions and for observations of phanerogamic associations, but also to obtain

fresh spore collections and to initiate tissue cultures (both essential for further experimental studies). In addition to material collected in the field, well-preserved herbarium specimens will be critically examined. Alpha taxonomic studies are essential in order for separation of taxa (estimated to be from 10-12 in North America), and to attempt rectification of nomenclatural problems through the study of type collections. Photographs of fresh specimens will be taken in addition to detailed descriptions of morphology and anatomy.

Several beta taxonomic techniques will be attempted. These include: scanning electron microscope examination of basidiospores (fixed or critical point dried material will be used when possible); genetic compatibility studies utilizing the techniques of Fries (1978) to obtain monocaryotic mycelium; electrophoretic analysis of enzyme patterns using disc electrophoresis and/or isoelectric focusing (Blaich, 1977); pigment analysis employing thin layer chromatography (Arpin, 1971); and cultural studies including both an examination of somatic cultures and attempts to induce basidiocarp formation under controlled environmental conditions (Mueller, 1978).

Information obtained from both the alpha and beta taxonomic phases of this study will be analyzed and interpreted by standardized statistical methods utilizing the digital computer.

In order to increase the potential of collecting different species of Laccaria and of observing a good representation of geographical and environmental interspecific variation, four major collecting trips are proposed:

1. Southern Florida Field Trip: September 1979 (9 days)

Several species of Laccaria have been described from the tropics and subtropics of South and Central America and

Mexico. Extensive collecting in southern Florida may reveal species heretofore believed only to occur further south.

2. Gulf Coast Field Trip: August 1980 (14 days)

The area around the Gulf Coast has been extremely poorly reported by mycologists and may therefore contain very interesting new material both of Laccaria and other fleshy fungi.

3. North East Field Trip: September 1980 (21 days)

Material collected from Maine, Vermont, New Hampshire, and New York is necessary for comparison with specimens collected in the mountains of the Southeast (extensive collecting in the Smoky, Cumberland, and Blue Ridge Mountains will be carried out utilizing funds from other sources--see below) and the Northwest (see 4. below).

4. North West Field Trip: June-October 1981 (110 days)

The first eight weeks of this time will be spent at the University of Montana Biological Station at Yellow Bay on Flat Head Lake attending a field mycology course taught by Dr. Orson K. Miller Jr. Attending this course offers a number of advantages: a) using the field station as the base of operations, a large portion of the surrounding area can be sampled, b) having several other people aid in the search of specimens should greatly increase the number of collections, and c) Dr. Miller is an eminent mycologist and studying under him would be a great opportunity. The remainder of the trip will be spent in Canada working west toward the coast in British Columbia and then down the coast to northern California following the fall rains.

The above itinerary is subject to modification depending on

weather conditions. Since dry weather can render a collecting trip disastrous, alternative sites may prove more fruitful.

Other sources of support: Grant proposals have been submitted to The Society of the Sigma Xi and to Highlands Biological Station, Highlands, North Carolina. These proposals are for commodities — photographic supplies and cultural media — and for subsistence during residence at the Biological Station, respectively.

The Department of Botany, The University of Tennessee will provide all other necessary materials.

Budget: The following notes should be considered part of the budget. Four collecting trips are proposed. Weather conditions may force alterations in the proposed collecting schedule. Transportation costs are based on the use of private car at the rate of 174 per mile. Except for the eight weeks spent at the field station in Montana, subsistence costs are calculated at \$35 per day — \$20 per diem room and \$15 per diem board.

BUDGET

Travel:

1979 Southern Florida Field Trip

Transportation (3000 mi @ 17¢/mi)	\$510
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Subsistence (8 days @ \$35/day)	280
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1980 Gulf Coast Field Trip

Transportation (2500 mi @ 17¢/mi)	425
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Subsistence (14 days @ \$35/day)	490
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North East Field Trip

Transportation (3200 mi @ 17¢/mi)	544
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Subsistence (20 days @ \$35/day)	700
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1981 North West Field Trip

Transportation (7600 mi @ 17¢/mi)	1292
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Room and Board at Flat Head Lake Field Station, Montana (8 weeks)	375
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Subsistence for remainder of trip (60 days @ \$35/day)	2100
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Total: Travel	6716
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Commodities:

Photographic supplies — film, processing	100
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Reagents — media ingrediants etc.	100
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Total: Commodities	200
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Total:	6916
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TOTAL REQUESTED FROM NSF: \$6,916

LITERATURE CITED

- Arpin, N. and J. L. Fiasson. 1971. The pigments of Basidiomycetes, Their chemotaxonomic interest. Pages 63-98 in R. H. Petersen, ed. Evolution in the higher Basidiomycetes. University of Tennessee Press, Knoxville.
- Berkeley, M. J., and C. E. Broome. 1883. Notices of British fungi. Ann. Mag. Nat. Hist. 12: 370-374.
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- Blaich, R. 1977. Enzymes as an aid in taxonomy of higher Basidiomycetes. Pages 215-228 in H. Clemençon ed. The species concept in Hymenomycetes. Cramer, Vaduz.
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- Cooke, M. C. 1884. New British fungi. Grevillea 12: 65-70.
- Fries, N. 1976. Spore germination in Boletus induced by amino acids. Proc. Ned. Akad. Wetensch., Ser. C, Biol. Med. Sci. 79: 142-146.
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- Fries, N. 1978. Basidiospore germination in some mycorrhiza-forming Hymenomycetes. Trans. Brit. Mycol. Soc. 70: 319-324.
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- Malençon, G. 1966. Laccaria lateritia espèce thermophile. Bull. Soc. Mycol. France 82: 181-184.
- McNabb, R. F. R. 1972. The Tricholomataceae of New Zealand. I. Laccaria Berk. & Br. New Zealand J. Bot. 10: 461-484.
- Miller, O. K. 1972. Mushrooms of North America. E. P. Sutton and Co., New York. 360 pp.
- Mueller, G. M. 1978. The genus Laccaria in southern Illinois. Master's thesis. Southern Illinois University, Carbondale. 64 pp.
- Nobles, M. K. 1965. Identification of cultures of wood-inhabiting Hymenomycetes. Canad. J. Bot. 43: 1097-1139.

- Singer, R. 1967. Notes sur le genre Laccaria. Bull. Soc. Mycol. France 83: 104-123.
- Singer, R. 1971. Forest mycology and forest communities in South America II. Pages 204-215 in E. Hacskeylo, ed. Mycorrhiza. U. S. Government Printing Office, Washington.
- Singer, R. 1975. The Agaricales in modern taxonomy. 3rd. ed. Cramer, Vaduz. 912 pp.
- Singer, R., and M. Moser. 1965. Forest mycology and forest communities in South America. I. The early fall aspect of the mycoflora of the Cordillera Pelada (Chili), with mycogeographic analysis and conclusions regarding the heterogeneity of the Valdivian flora district. Mycopathol. Mycol. Appl. 26: 129-191.
- Smith, A. H. 1949. Mushrooms in their natural habitats. Sawyers, Portland. 626 pp.
- Stack, R. W., W. A. Sinclair, and A. O. Larsen. 1975. Preservation of basidiospores of Laccaria laccata for use as a mycorrhizal inoculum. Mycologia 67: 167-170.
- Trappe, J. M. 1962. Fungus associates of ectotrophic mycorrhizae. Bot. Rev. (Lancaster) 28: 538-606.
- Trappe, J. M. 1977. Selection of fungi for ectomycorrhizal inoculation in nurseries. Annual Rev. Phytopathol. 15: 203-222.

VITA SHEET

Mr. Gregory M. Mueller
Department of Botany
The University of Tennessee
Knoxville, Tennessee 37916
phone (615) 974-2256

Education

The University of Tennessee, Knoxville, TN
Doctoral Student in Botany 1978-1982

Southern Illinois University, Carbondale, IL
M.S. in Botany September 1978

B.A. in Botany May 1976

Belleville Area College, Belleville, IL
A.A. in Science May 1974

Southern Illinois University, Edwardsville, IL
Course work in music education September, 1971-May, 1973

Belleville Township High School East, Belleville, IL
June 1971

Teaching and related experience

The University of Tennessee, Knoxville, TN

Graduate Teaching Assistantships

Instructor in General Biology
Sept. 1978-June 1979

Southern Illinois University, Carbondale, IL

Graduate Teaching Assistantships

Instructor in Plant Diversity Laboratory
Aug. 1977-Aug. 1978

Instructor in Ferns, Trees, and Wildflowers
(non-majors field course) June 1977-Aug. 1977

Assisted in General Ecology
Jan. 1977-May 1977.

Graduate and Undergraduate Student Work

Botany Herbarium Aug. 1976-Jan. 1977

Botany Greenhouses Aug. 1974-July 1976

Committees

Graduate representative on departmental graduate policies committee 1978

Graduate Student Council 1977-1978

Research Grants and Scholarships

Sigma Xi, Grant-in Aid of Research. 1977. "A monograph of the genus Laccaria in southern Illinois: with emphasis on correlation of anatomical and morphogenetic characters." \$100.

Illinois State Scholarship

Memberships in professional organizations and societies

Mycological Society of America (1976)

North American Mycological Association (1976)

Association of Southeastern Biologists (1977)

Illinois Academy of Science (1976)

Tennessee Native Plant Society (1978)

SIU Botany Club (1975-1978)

BSASS (UT botany club) (1978)

Professional meetings attended

Illinois State Academy of Science
Normal, IL April 1978

A. H. Smith Lake States Foray
Lake Itasca State Park, MN Sept. 1977

Illinois State Academy of Science
St. Louis, MO May 1977

A. H. Smith Lake States Foray
Dixon Springs State Park, Vienna, IL
Sept. 1976

Extended collecting trips

2 weeks in Nova Scotia, Canada Sept. 1978 .

Papers and publications

Mueller, G. M. 1978. The genus Laccaria in southern Illinois. Page 13 in Abstracts. Illinois State Academy of Science. 1978 Annual Meeting, Normal, Illinois. (Abstr.).

Mueller, G. M. 1978. The genus Laccaria in southern Illinois. Master's thesis. Southern Illinois University, Carbondale. 64pp.

Vita For

Dr. Ronald H. Petersen

Department of Botany
University of Tennessee
Knoxville, Tennessee 37916

I. Personal:

Born: July 24, 1934 - Jersey City, New Jersey

Education: Dwight Morrow High School, Englewood, New Jersey 1949-52

Colgate University, Hamilton, New York 1952-56, B.A. in
Botany

Cornell University, Ithaca, New York 1956-57

Columbia University, New York City 1957-61, M.A. and
Ph.D. in Botany

Marital Status: Married, three children

II. A. Academic:

Teaching assistant in Mycology, Columbia University, 1959-61

Assistant Professor, State University of New York at Buffalo, 1961-65

Departmental assignments:

Student Credentials Committee

Honors Program Committee

Graduate Student Teaching Evaluation Committee

Student Recruitment Committee

Curriculum Revision Committee

Assistant Professor, University of Tennessee, January 1965-June 1965

Associate Professor, University of Tennessee, July 1965-1970

Departmental committee assignments:

Departmental Steering Committee

Head of Honors Botany, 1966, 1967

Graduate Study Committee (Chrp.)

Departmental Evaluation Committee

Curriculum Committee

Goals and Means Committee

Assistant to the Dean of Liberal Arts, 1968-1970

College Committee on Honors Programs (Chrp.) 1968-69

College Committee on Academic Standing (Chrp.) 1968-69
 Senate Committee on Student Evaluation 1968-70
 College Committee on Scholarships (Chrp.) 1968-70

Professor, University of Tennessee, 1970-Present

Faculty Senate 1970-73
 Graduate Council 1971-74
 University Curriculum Committee 1971-73
 President, AAUP 1970-71
 Senate Advisory Council to the Vice Chancellor for Academic
 Affairs, 1971-72
 Chairperson, Biochemistry Head Search Committee, 1974-75
 Coordinator of Graduate Studies, Botany Department, 1969-74
 Chairperson, Hesler Hall Renovation Committee, 1975-Present
 Chairperson, Plant Physiologist Search Committee, Botany
 Department, 1976
 UT Press Editorial Board, 1977-79
 College Committee on Committees, 1974-76

Acting Department Head (occasional), 1973-Present

B. Theses and Dissertations directed:

State University of New York at Buffalo:

Paul D. Olexia (M.S.) 1964. "Cultural characteristics of
 Polyporus sanguineus and P. cinnabarinus."

James J. Deploey (M.S.) 1964. "The effects of different wave-
 lengths of light on the growth and differentiation of the
 basidiomycete Coprinus macrorhizus Rea f. microsporus Hongo."

The University of Tennessee:

Paul D. Olexia (Ph.D.) 1968. "The genus Clavaria sensu strictu
 in North American species."

James L. Dodd (Ph.D.) 1970. "The genus Clavicornia, with emphasis
 on North American species."

Alice Jameson (M.S.) 1973. "Characterization of the pigments of
Clavulinopsis fusiformis."

John Pinnix (M.S.) 1974. "Cultural characteristic of Herichium."

David L. Jenkins (Ph.D.) 1974. "Amanita sect. Amanita in North
 America."

Mary Priscilla Campbell (M.S.) 1974. "Cultural characteristics of
 certain Amanita taxa."

Barbara Dyko Faxlanger (Ph.D.) 1977. "Aquatic hyphomycetes of the southern Appalachian Mountains."

Alicia E. Freeman (Ph.D.) 1977. "Agaricus in the southeastern United States."

Glenn W. Freeman (Ph.D.) 1978. "The genus Gloeocystidiellum in North America."

Carl B. Wolfe, Jr. (Ph.D.) 1978. "Porphyrellus in North America."

Edmond G. Badham (M.S.) 1978. "The effect of light on the fructification of Psilocybe cubensis (Earle) Sing."

Brian Luther (M.S.) 1979. "The genus Lidtneria in North America."

Gregory Mueller (Ph.D.) 1981. "The genus Laccaria in North America."

Deborah Doyle (M.S.), date and title uncertain.

Philip Wiltshire (M.S.), date and title uncertain.

C. Post-doctoral fellows:

Dr. M. A. Donk, Rijksherbarium, Netherlands, 1969-70. NSF Visiting Scientist Grant.

Dr. K. Natarajan, University of Madras, 1973-74. UNESCO Grant through Institute for International Education.

D. Pre-doctoral fellows:

Marcia Hubbard, Kalamazoo College, 1976, senior honors project.

Ermelinda Freire, Amazonas University, 1978, INPA training grant.

III. Professional and Research:

A. Grants and Scholarships:

Gertrude Burlingham Scholar at The New York Botanical Garden, Summer, 1959, 1960.

National Science Foundation grant through Highlands Biological Station, Highlands, North Carolina, 1959 (2)1, 1960, 1961.

National Science Foundation grant GB-369, "A taxonomic study of Clavariaceae of the eastern United States and Canada," three years (1962-65), \$13,000.

American Philosophical Society grant (Penrose Fund) for collection of specimens of Clavariaceae in Ontario, 1962.

Research Foundation of New York grant 50-683A, "Cultural Taxonomy of the Clavariaceae," 1964.

University of Buffalo Committee on Grants and Allocations grant, "A taxonomic and nomenclatural study of the Clavariaceae of the eastern United States," 1962.

National Science Foundation grant GB 3353, "The genera Clavulinopsis, Lentaria and Clavulina in North America," three years (1965-1968), \$28,000. Extension - \$4,400, 1968.

National Science Foundation grant GZ-1002, "A symposium on the evolution of higher Basidiomycetes," 1968. \$16,500.

U.T. Faculty Research Grant, 1969, \$1,000.

National Science Foundation Grant, Visiting Foreign Scientist Award to Dr. M.A. Donk (Leiden, Holland), 1969-70. \$17,000.

U.T. Faculty Research Grant, 1970, \$1,500.

U.T. Faculty Research Grant, 1971, \$1,000.

National Science Foundation Grant: Short Course "The Role of Basidiomycetes in the forest ecosystem," 1971-72, \$30,000.

National Science Foundation Grant, 1972-74. "The genus Ramaria in North America." \$21,500.

National Science Foundation to Mr. David Jenkins, 1972-73. "Amanita subg. Amanita in North America." \$1,400.

National Science Foundation, summer institute: "Field sampling and domestication of cryptogamic plants," 1973, \$74,000.

National Institutes of Health (UT Graduate School); 1974. "The use of Amanita cultures in the production of amanitins." \$1,400.

National Science Foundation; 1975-77. "The genus Phaeoclavulina in North America." \$31,700.

S. W. Herbet Foundation (Switzerland). For participation in Symposium on species concept. 1976. \$1,100.

National Science Foundation: to Ms. Barbara Dyko; 1976-77. "Aquatic Hyphomycetes of the Southern Appalachian Mountains." \$1,600.

National Science Foundation, International Programs: 1977. "Clavarioid Fungi of Southern Australia." \$3,100.

B. Membership in professional and learned societies:

- Phi Beta Kappa (Honorary, 1976)
- Society of the Sigma Xi (1961)
- Mycological Society of America (1957)
- Botanical Society of America (1957)
- British Mycological Society (1960)
- Société Mycologique de France (1966)
- American Institute of Biological Sciences (1964)
- Czechoslovak Scientific Society for Mycology (1969)
- Torrey Botanical Club (1959-66)
- Puget Sound Mycological Club (Honorary) (1968)
- International Association for Plant Taxonomy (1959)
- North American Mycological Association (1968)
- American Association of University Professors (1964)

C. Offices in Societies:

- 1966: Chairperson, Northeast Section, Botanical Society of America
National Board, Botanical Society of America
- 1968-70: Council, Mycological Society of America
- 1970: Program Chairperson, Mycological Society of America
- 1969-73: Board of Trustees, Highlands Biological Station
- 1970-71: President, Tennessee Chapter, AAUP
- 1970-71: Board of Trustees, University of Tennessee Federal Credit
Union
- 1972-73: Activities Committee, SE Section, Botanical Society of
America
- 1973-76: Board of Trustees, Highlands Biological Station
- 1973-75: Secretary, Special Committee for Fungi and Lichens (International
Association for Plant Taxonomy, Nomenclature Section)
- General Committee on Nomenclature, International Association for
Plant Taxonomy.

- 1973- : Nomenclature Committee, Mycological Society of America
- 1973- : Subcommittee, Secretariat, Committee on Nomenclature, International Mycological Association
- 1975-80: Secretary, Special Committee for Fungi and Lichens (International Association for Plant Taxonomy, Nomenclature Section).
- General Committee on Nomenclature, International Association for Plant Taxonomy.
- Nomenclature Editor, "Taxon".
- Book reviewer, "Economic Botany".
- 1976- : Board of trustees, Highlands Biological Station Foundation.
- 1977: Program Committee, 2nd International Mycological Congress, Tampa.
- Secretariat, International Mycological Association Nomenclature Committee.
- Board of trustees, Highlands Biological Foundation.
- 1978: University of Tennessee Sigma Xi Committees on Admissions and Nominations.

D. Meetings Attended (most recent 10 years):

- 1969: North American Conference on Mycorrhizae, Urbana, Illinois; XI International Botanical Congress, Seattle, Washington; Conference on Underachievement in College, Claremont, Calif.; Southeast Student Affairs Administrators Conference, Knoxville; Conference on Experimental Curricula, Chicago, Illinois.
- 1970: ASB Meetings, Lakeland, Florida; Mississippi Valley Deans Conference, Knoxville; State AAUP Conference, Memphis, Tennessee; Wildflower Pilgrimage, Gatlinburg, Tennessee (paper presented); VI European Mycological Congress (Copenhagen).
- 1972: Dreiländertagung; Brienz, Switzerland; Deutsches Mykologische Gesellschaft, Regensburg, Germany; AIBS Meetings, Minneapolis, Minnesota; ASB Meetings, Mobile, Alabama; Schweizer Mykologische Gesellschaft, Einsiedeln, Switzerland.
- 1973: International Symposium on Fungal Taxonomy, Madras, India; ASB Meetings, Bowling Green, Ky.; AIBS Meetings, Amherst, Mass.

- 1974: ASB Meetings, Savannah, Ga.;
Nordiska Mykologiska Kongressen, Garpenberg, Sweden.
- 1975: ASB Meetings, Blacksburg, Va.;
AIBS Meetings, Corvallis, Oregon;
Symposium on Distribution of Fungi and Algae, Blacksburg, Va.
- 1976: AIBS Meetings, Tulane University;
North American Mycological Association, McCall, Idaho;
Couer d'Alene Mushroom Club Foray;
Symposium on Species Concept in Higher Basidiomycetes,
Lausanne, Switzerland.
- 1977: Second International Mycological Congress, Tampa (Program Committee);
Field trips for international group after IMC2 (host);
Uplands Regional Field Research Laboratory meeting.
- 1978: Symposium on rare plants of the southern Appalachians, VPI;
Highlands Biological Station, Board of Trustees and Executive
Committee.

E. Significant Field Experience (most recent ten years):

- 1969: Four weeks, Idaho, Washington, Oregon.
- 1970: Four weeks, Sweden, Denmark.
- 1971: Five weeks, North Carolina, Upper Michigan.
- 1972: Six weeks, central Europe (Germany, Austria, Italy, Switzerland);
Twelve weeks, Rijksherbarium, Leiden, Holland.
- 1973: Four weeks, Nova Scotia, Canada; summer, southern Appalachians.
- 1974: Eight weeks, central and northern Europe, including Sweden.
- 1975: Eight weeks, Southern Appalachian mountains;
Two weeks (Spring), central and northern Idaho.
- 1976: Four weeks, central and northern Idaho.
- 1977: Six weeks, Tahiti, Australia, Indonesia, Switzerland, The
Netherlands.
- 1978: Three weeks, Nova Scotia.

F. Consultantship: Pennsylvania Environmental Management Corp., 1977-78.

G. Publications:

Books:

Evolution in the Higher Basidiomycetes, University of Tennessee Press.
562 pp. (Editor).

Ramaria subg. Lentoramaria, with emphasis on North American taxa.
Biblioth. Mycol. vol. 43: 161 pp.

The New Harp of Columbia [a shaped-note tunebook: fascimile edition from UT Press, with introductions by RHP and others].

The genus Phaeoclavulina, with emphasis on North American taxa.
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