Hunt Institute for Botanical Documentation
5th Floor, Hunt Library
Carnegie Mellon University
4909 Frew Street
Pittsburgh, PA 15213-3890
Telephone: 412-268-2434
Email: huntinst@andrew.cmu.edu
Web site: www.huntbotanical.org

The Hunt Institute is committed to making its collections accessible for research. We are pleased to offer this digitized item.

Usage guidelines
We have provided this low-resolution, digitized version for research purposes. To inquire about publishing any images from this item, please contact the Institute.

Statement on harmful and offensive content
The Hunt Institute Archives contains hundreds of thousands of pages of historical content, writing and images, created by thousands of individuals connected to the botanical sciences. Due to the wide range of time and social context in which these materials were created, some of the collections contain material that reflect outdated, biased, offensive and possibly violent views, opinions and actions. The Hunt Institute for Botanical Documentation does not endorse the views expressed in these materials, which are inconsistent with our dedication to creating an inclusive, accessible and anti-discriminatory research environment. Archival records are historical documents, and the Hunt Institute keeps such records unaltered to maintain their integrity and to foster accountability for the actions and views of the collections' creators.

Many of the historical collections in the Hunt Institute Archives contain personal correspondence, notes, recollections and opinions, which may contain language, ideas or stereotypes that are offensive or harmful to others. These collections are maintained as records of the individuals involved and do not reflect the views or values of the Hunt Institute for Botanical Documentation or those of Carnegie Mellon University.

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

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

Department of Botany
LOUISIANA STATE UNIVERSITY AND AGRICULTURAL AND MECHANICAL COLLEGE
BATON ROUGE · LOUISIANA · 70803-1705
504/388-8485

10-X-1983

Dear Ken;

It was good to hear from you, and to know that you are lucky enough to be spending your sabbatical year in Tübingen working in Franz Oberwinkler's lab. Franz is certainly one of the great contemporary contributors to the clarification of some heretofore puzzling aspects of the relationships among the Heterobasidios, and I think you should make a fine team working together.

Retirement has its advantages, but during the past year I have been unable to utilize most of the time available to me for productive work. On my return from Budapest last August I sprained my back quite badly by having to carry overweight luggage at the airport, and now, after several bouts in the hospital, I am considerably restricted in my activities. A surgeon told me that I need an operation, but I am unwilling to take the risk of becoming a wheelchair case. Lately, however, there have been signs of improvement, following a regimen of therapy. Meanwhile, I cannot go on field trips, and do only limited microscopic work, although I come into the herbarium almost every day.

I would love to return to Hungary. My colleagues Gábor Bohus and Margit Babos (both agaricologists) in Budapest showed me around the herbarium where I saw a cabinet full of tremellaceous fungi including quite a lot of partially identified or unidentified material. Apart from the mycological possibilities in Hungary, I was deeply impressed with the country during my month's stay. I have had an emotional attachment to all things Hungarian since childhood, since both my parents were born there. They left Hungary at the turn of the century and met in New York City, where I was born. I still have a fair competence in the language, and spoke only Hungarian with my colleagues who were glad not to have to struggle with English.

Last October, in spite of my bad back, I attended the 1st Mexican Mycological Congress in Xalapa, where I had been invited to give the principal address in the ethnomycological section. Rolf Singer and Arthur Welden were the only other foreigners to participate as invited guests. Later, I felt that I could not turn down an invitation to speak at the inauguration of the Valentina and R.Gordon Wasson Ethnomycological Collection at Harvard University in February. I saw Wasson (now 85 years old) only for the second time, the first having been in Bloomington, Indiaha in 1960 when he gave the annual address at the MSA meeting.

There is surely no hurry about the material I sent you, but possibly some of it may turn out to be of interest. If I am not mistaken, you became adept in Portuguese during your stay in São Paulo, and now you have a great opportunity to perfect your German as well.

as ever, Bernie

Please give my kindest regards to Franz!

K. Wells, F. Oberwinkler

UNIVERSITÄT TÜBINGEN
LEHRSTUHL SPEZIELLE BOTANIK
UND BOTANISCHER GARTEN

D 7400 Tübingen 1
Auf der Morgenstelle 1
Telefon (07071) 292610

9/24/83

Dear Bernie:

This a very belated thanks for the collections from Brazil that you sent me in May of 1982. I have taken a preliminary look at three of them. Two are Bourdotia galzinii and one is a species of Exidiopsis that I am unable to recognize

I am here in Tübingen on Sabbatical Leave for about 7 months. We arrived on the 9th of September and are now more or less settled at the apartment and in the lab. Oberwinkler has about all the facilities that a mycologist could possibly need.

I had heard from someone that you had retired, but I didn't realize that it was 1980. I am looking forward to retirement so that I can spend more time with mycological things; however, it will be another 5-7 years yet.

Your trip to Budapest sounds interesting. We drove through there several times in 1971-72 when we were on Sabbatical Leave in Romania. We really didn't get to see much of the city or the country, except for the road to and from Bucharest. Also, the language is terribly difficult for us. Certainly if one spoke the language, I'm certain it would be of great help. Because my wife speaks fluent German, she was born here, life is much simplier for all concerned.

Well I trust you are enjoying your retirement. Think of us poor souls with all the paper shuffling and students once in while. I'll write further about your specimens. Oberwinkler and I are trying to do something with Bourdotia and Basidiodendron, but it will take a good deal of work.

With best wishes! Please excuse my typing and typewriter, which is a very small portable borrowed from my niece.

Sincerely,

Ken

INSTITUTO POLITECNICO NACIONAL
ESCUELA NACIONAL DE CIENCIAS BIOLOGICAS
Apartado Postal 26-378
México 16 D.F.

SECRETARIA
DE
EDUCACION PUBLICA

March 4, 1982.

Dr. B. Lowy
Department of Botany
Lousiana State University
Baton Rouge, Louisiana 70803
E. U. A.

Dear Dr. Lowy:

I read your interesting paper on Mycologia 73 together with Oberwinkler, about Syzygospora alba reported from Mexico, based only in one of my collections that say is deposited here in my herbarium, but I have not this specimens because I sent you time ago. Would you be kind to send me a duplicate of the specimen Guzmán 11843 to be deposited here? This specimen I sent you together with a set of Mexican Tremellales, that you returned me last year, except the specimen 11843, because you say me it needs more study. You can keep a duplicate of this species, but I need the main part, in order to deposit here and even to know it, and to can loan. Recently, the Curator of National Mycological Herbarium of Ottawa Ontario, Canada, ask me on loan this specimen for study.

I was a pleasure to see you here in Mexico City last week. I hope to see you this year in Xalapa during the 1st. Mycological Congress in Mexico.

Sincereley yours,

Dr. Gastón Guzmán

Franz

18-III-1982

Dr. Franz Oberwinkler
Universität Tübingen
Lehrstuhl Spezielle Botanik
Auf Der Morgenstelle 1
D 7400 Tübingen 1, DDR

Dear Franz:

Dr. Castón Guzmán has written to me (a copy of his letter is enclosed), asking for a part of his collection No. 11843 of Syzygospora alba Martin, cited in our joint paper in MYCOLOGIA. I believe that you have in your harbarium all the original material that I sent you in 1978, and I would like to ask you whether you would be good enough to send Dr. Guzmán a part of that collection for his herbarium. When I was in Mexico a few weeks ago he mentioned it to me, and I was not certain then whether or not I had sent you the entire collection. But I find none of it here in my herbarium. The world is already dangerously close to upheaval, and I think we may be able to avert an international incident by complying with Guzmán's request.

With best wishes,

Bernard

B. Lowy

Department of Botany
LOUISIANA STATE UNIVERSITY AND AGRICULTURAL AND MECHANICAL COLLEGE
BATON ROUGE · LOUISIANA · 70803
504/388-8485

20-I-1982

Dear Franz:

After an absence of several weeks from the university I have returned to face a large backlog of mail which included your good wishes for the New Year, and which I heartily reciprocate. I have also received from the printer separates of our joint paper in MYCOLOGIA. Earlier, I directed the printer to send you 100 reprints with covers, and when you receive them please confirm their arrival. As I suggested, the bill will be paid by the Botany Department, so you should receive no charges.

I hope you have a satisfying, productive year full of good works.

Cordially,

Bernard

make reprints

MYCOLOGIA

Instructions for Proofs and Page Charges

Proofs: Please read the enclosed proof carefully, making only absolutely necessary changes, and return promptly. Author's will be charged for alterations where warranted. Mark on the margin of the proof where figures, tables, etc., if any, should be inserted. Also, indicate clearly if there are places where additions (page numbers, incomplete references, etc.) will have to be made by the editor in page proof. Do not return your artwork unless it is necessary to remake an engraving.

Your manuscript will be discarded upon publication unless you notify us to return it.

Page charges: The enclosed page charge form must be completed and **returned with the galley proofs to:**

Publications Office,
New York Botanical Garden,
Bronx, N. Y. 10458.

DO NOT INCLUDE REPRINT ORDER—see below

Instructions for ordering reprints

Please note that reprints are ordered directly from the printer. Therefore, purchase orders for reprints should be made out to: Lancaster Press, Inc., Lancaster, Pa. 17604. However, indicate below the number of reprints desired as well as billing and shipping instructions. RETURN THIS ORDER FORM WITHIN TEN (10) DAYS to: Lancaster Press, Inc. Please do *not* include page charges on reprint purchase order.

NOTE: Postage charges will be in addition to the prices shown below.

PRICE LIST OF REPRINTS

Copies	1–4 Pages	5–8 Pages	9–12 Pages	13–16 Pages	17–20 Pages	21–24 Pages	25–28 Pages	29–32 Pages	Covers
50	20.10	41.39	61.96	82.86	104.62	124.26	144.75	165.65	21.64
~~100~~	22.70	~~45.25~~	68.41	90.51	113.61	135.71	158.79	180.96	~~27.95~~
Add'l 100's	5.19	~~7.66~~	12.85	15.31	17.91	22.89	28.08	30.61	~~12.65~~

= $93.51

For 500 copies deduct 5%; for 1000 or more deduct 10%.

For more than 32 pages add cost per schedule to make total. Example: for 44 pages add cost for 32 pages and 12 pages.

Note: For any reprints requiring additional composition or changes, either in text or cover, an extra charge will be made.

REPRINT ORDER FOR ARTICLE BY: F. Oberwinkler and B. Lowy
(Authors)

Article Title Syzygospora alba, a mycoparasitic Heterobasidiomycete

To estimate the number of pages in your article, multiply the number of galleys by 3.

Total number ordered ..... 200 ~~Without Covers~~ / With Covers } Cross out one not wanted

Send to: DR. F. OBERWINKLER
LEHRSTUHL SPEZIELLE BOTANIK
UNIVERSITAT TUBINGEN
AUF DER MORGENSTELLE 1
D 7400 TUBINGEN 1, WEST GERMANY

DR. B. LOWY
BOTANY DEPARTMENT
LOUISIANA STATE UNIVERSITY
BATON ROUGE, LA 70803

Bill to: BOTANY DEPARTMENT
LOUISIANA STATE UNIVERSITY
BATON ROUGE, LA 70803

Paid, LSU

SYZYGOSPORA ALBA, A MYCOPARASITIC HETEROBASIDIOMYCETE

F. OBERWINKLER

AND

B. LOWY

Reprinted from MYCOLOGIA, Vol. LXXIII, No. 6, Nov.–Dec. 1981
Printed in U. S. A.

Dear Bernard,

I wish you
merry Christmas
and a happy
New Year

Franz

Department of Botany
LOUISIANA STATE UNIVERSITY AND AGRICULTURAL AND MECHANICAL COLLEGE
BATON ROUGE · LOUISIANA · 70803
504/388-8485

6-X-1981

Dear Franz,

Your drawings have just been returned by the editor of Mycologia, so I am forwarding them to you.

I don't know whether you are interested in ethnomycology, but I am enclosing a paper of mine that just appeared (± 1 yr. late!) in which I offer a new interpretation of some figures in the Codex Dresdensis, and other related matters.

With best regards,

Bernard

Department of Botany
LOUISIANA STATE UNIVERSITY AND AGRICULTURAL AND MECHANICAL COLLEGE
BATON ROUGE · LOUISIANA · 70803
504/388-8485

10-VIII-1981

Prof. Dr. F. Oberwinkler
Universitat Tubingen
Lehrstuhl Spezielle Botanik
Institut fur Biologie 1
D 7400 Tubingem 1
Auf der Morgenstelle 1
DDR

Dear Franz:

Probably because of the airline controllers strike your letter took 8 days to reach me from Canada. Overseas flights may not be affected as much, at least at present, so that when you return from Australia this should have reached you.

I would like to ask you to check your notes concerning the type of Pseudotulasnella guatemalensis Lowy, since I sent this together with Phyllogloea singeri Lowy to Dr. Merxmuller about 10 years ago, supposedly for your use (see enclosed correspondence). In February 1981 I sent you P. singeri along with Neotremella guzmanii Lowy, and I presume that you still have these. Would you be good enough to clear this up for me? I am always glad to cooperate with you, and if you did not get to examine the type of P. guatemalensis I shall of course send it to you, but since repeated mailings inevitably result in some breakage of this rather fragile material, I prefer to check with you first about this.

I hope you had a very successful meeting in Sydney. When you get settled down again I shall be glad to hear from you.

With best wishes,

as ever,

Bernard

The New York Botanical Garden

Bronx, New York 10458 (212) 220 8700

MYCOLOGIA

Dear Colleague:

Please return the enclosed materials as follows:

Corrected Page Proofs:

Dr. Terry W. Johnson
Editor MYCOLOGIA
Department of Botany
Duke University
Durham, NC 27706 USA

Copyright Assignment Form and Publication Charges Form:

Publications Office
The New York Botanical Garden
Bronx, NY 10458 USA

Reprint Order Form:

Lancaster Press Inc.
P.O. Box 3657
Lancaster, PA 17604 USA

Thank you for your cooperation.

Cordially,

María L. Lebrón-Luteyn

Maria L. Lebron-Luteyn Ph.D.
Curator of Publications

encl

received: 14-IX-'81

The New York Botanical Garden

COPY FOR YOUR FILE

MYCOLOGIA 73(6)

Assignment of Copyright

In accordance with Public Law 94-553, which will ensure fullest protection of the rights of Mycologia and its authors, we ask that you formally transfer copyright ownership to the New York Botanical Garden so that Mycologia may continue to be copyrighted in the publisher's name. We will continue to require that during your lifetime your permission, as well as that of the New York Botanical Garden, be obtained by anyone wishing to reprint figures, tables, or substantial segments of text from Mycologia. We will require that any such figure, etc., from Mycologia must be cited in the new article as being reproduced with permission from Mycologia and B. Lowy. We will also continue to allow you to reprint or reuse your own original material without requesting permission.

In the light of the foregoing explanation and in consideration of the fact that the New York Botanical Garden undertakes to publish my article,

Syzygospora alba, a mycoparasitic heterobasidiomycete

in a forthcoming issue of Mycologia. I hereby assign all literary property rights in the article to the New York Botanical Garden.

Signature_____ Date_____

Name_____

Address_____

_____

SYZYGOSPORA ALBA, A MYCOPARASITIC HETEROBASIDIOMYCETE[1]

F. OBERWINKLER

Lehrstuhl Spezielle Botanik und Botanischer Garten der Universität Tübingen, Auf der Morgenstelle 1, D 7400 Tübingen 1, West Germany

AND

B. LOWY

Department of Botany, Louisiana State University, Baton Rouge, Louisiana 70803

SUMMARY

Syzygospora alba is recognized as a mycoparasite and its anamorphs and teleomorphs are illustrated and redescribed from a recent collection from Mexico. The basidiocarps are similar to those of some species of the genus *Tremella*. Haustoria of the *Tremella* type attach to and penetrate into the basidiomycetous host cells. Holobasidia produce basidiospores capable of yeast-like budding. The dolipore septa appear to be similar to those in species of the genera *Filobasidium* and *Filobasidiella*. On the basis of these characters a heterobasidiomycetous affinity is proposed. The name *Syzygospora alba* is accepted for the holomorph of the species. It appears that this taxon is generically different from *Christiansenia pallida*.

Mycoparasitism is widespread among different species of Basidiomycetes, especially of Heterobasidiomycetes. Many species of *Tremella* are parasitic on other fungi. The parasitic behavior is often clearly indicated by the presence of haustorial hyphae which penetrate into the host cells. In addition, the host-parasite interaction sometimes can be observed in the changed morphology of the host, as in *Tremella encephala* Pers. ex Pers. on *Stereum sanguinolentum* (A. & S. ex Fr.) Fr. (Bandoni, 1961) or *Tremella aurantia* Schw. on *Stereum hirsutum* (Willd. ex Fr.) S. F. Gray. Several of these *Tremella* species share a common fruiting body structure by which they can be recognized in the field.

A fungus collected by G. Guzmán in Mexico, and with the external appearance of a *Tremella*, was sent to us for identification. The

[1] Part 10 in a series "Studies in Heterobasidiomycetes" of the Institut für Biologie I, University of Tübingen.

species lacked the leading character of the Tremellaceae, *viz.*, the cruciate-septate basidium. Therefore a more detailed study was carried out to determine the appropriate taxonomic position of the fungus.

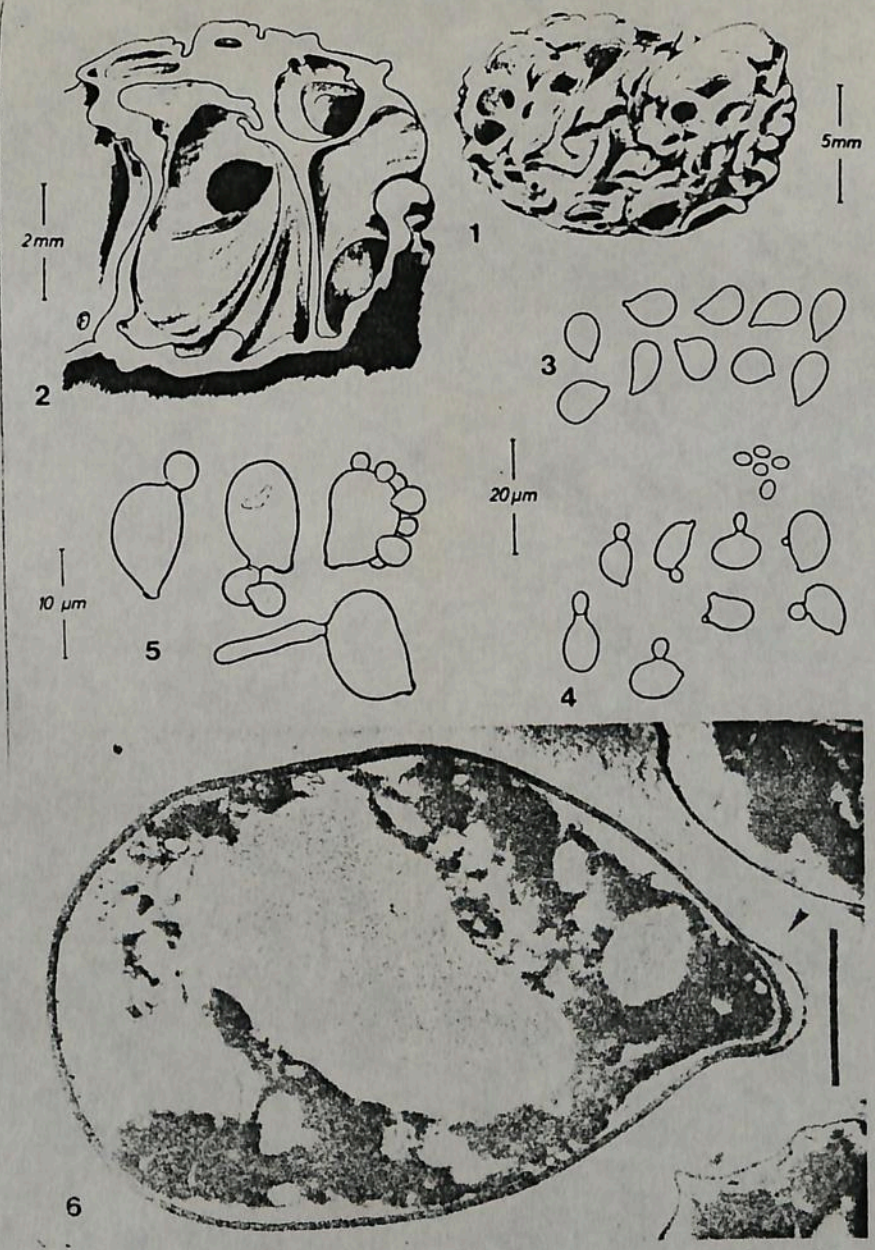
MATERIALS AND METHODS

The following specimens are described and illustrated in the present contribution. *Syzygospora alba* Martin, Fungi of Panama, Prov. Chiriquí: Valley of the upper Río Chiriquí Viejo, alt. 1600–1800 m, July 1, 1935; G. W. Martin No. 2167, holotype (Herb. State Univ. Iowa, now BPI). *Syzygospora alba*, Mexico: Entre Los Guayabos y Las Cabanãs, 15 km al SW de Mazamitla, Carretera a Tamazula, Jalisco; bosque de *Pinus-Quercus*, muy perturbado, en transacción con vegetación subtropical; alt. 1700–1800 m, Agosto 24, 1974; Col. G. Guzmán, No. 11843 (Herbario de la Escuela Nacional de Ciencias Biólogicas, Instituto Politécnico Nacional, México, D. F.).

For transmission electron microscopy material was soaked in water, then fixed with glutaraldehyde and osmium tetroxide, washed with distilled water, dehydrated in an alcohol series, and embedded in ERL according to Spurr (1969). Ultrathin sections were mounted on unsupported mesh copper grids, poststained in uranyl acetate and lead citrate solutions, and examined in a Zeiss EM 9 S-2 transmission electron microscope.

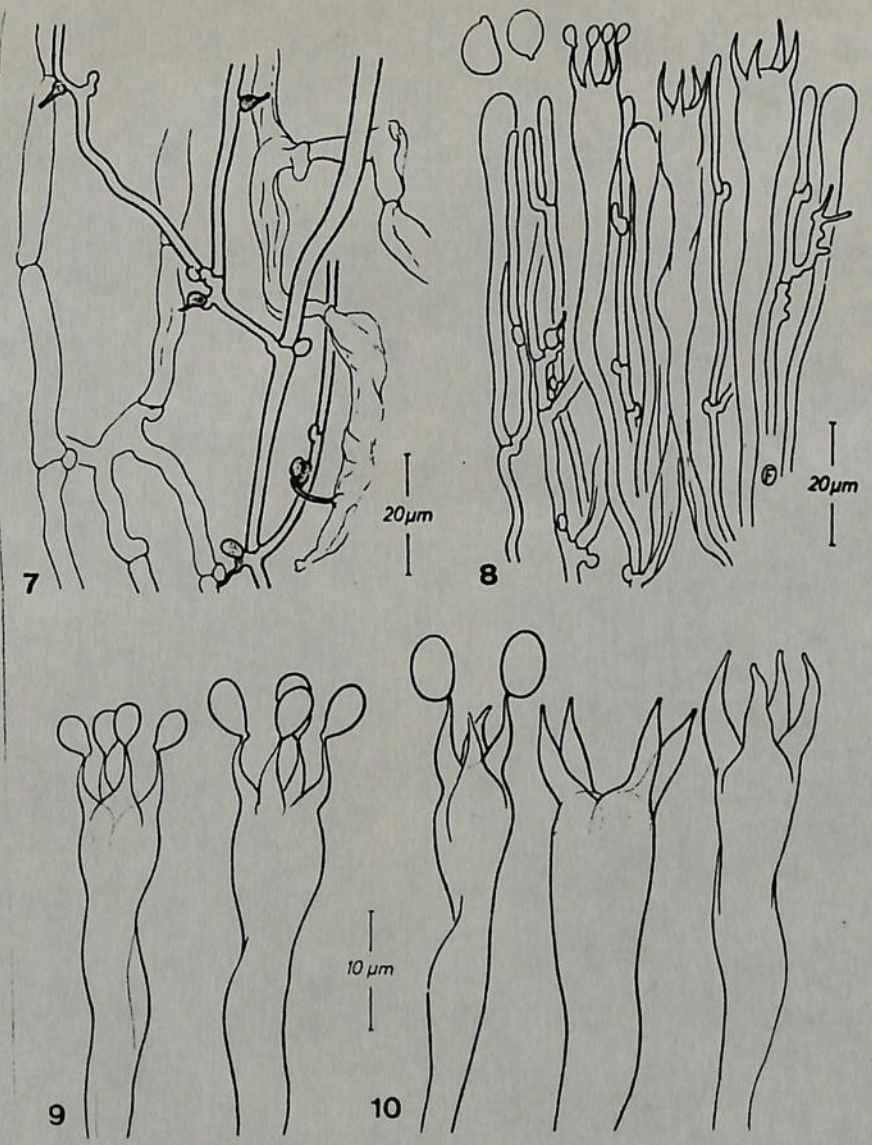
RESULTS

The basidiocarps of *Syzygospora alba* are tremelloid and gyrose (FIGS. 1, 2). This structure is apparently not or not essentially produced by gall-like, hypertrophic growth of the host. In dried specimens the fruiting bodies are brownish and have a very tough to hard-horny consistency, but may be soft-gelatinous when they are fresh. The trama consists of a layer of hyphae 2–4 μm in diam, hyaline, thin-walled, loosely branched, the branches commonly originating from clamps (FIGS. 7, 8). Short, very narrow hyphal outgrowths capable of functioning as haustoria (FIGS. 7, 8, 12) are formed mainly from clamp swellings. The hymenium (FIG. 8) is composed of long, apically swollen basidia (50–100 × 6–8 μm) with four curved, stout sterigmata (FIGS. 9, 10), which bear asymmetrically formed basidiospores. Sometimes partly cruciate-septate basidial apices can be found (FIGS. 9, 10), which appear *Metabourdotia*-like as described by Olive (1957), and by Lowy (1964) for *Pseudotulasnella*. The basidia are in-



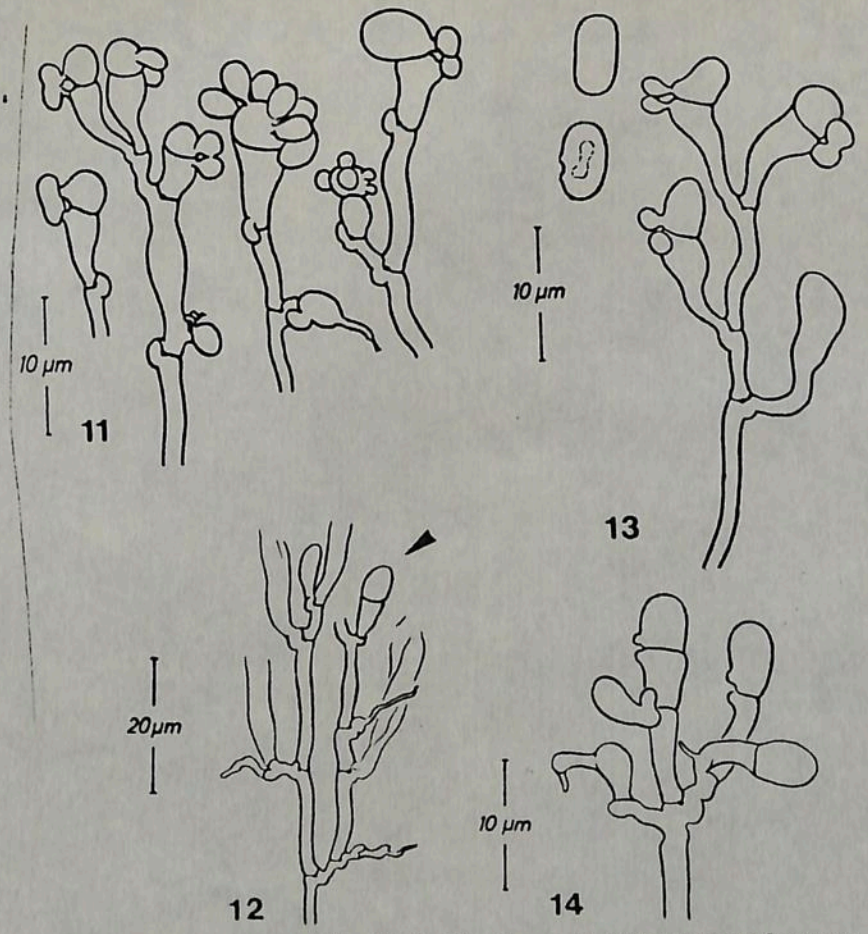
FIGS. 1–6. *Syzygospora alba*. 1. Habit sketch of dried herbarium specimen. 2. Section through a dry basidiocarp showing the gyrose morphology. 3. Mature basidiospores. 4. Budding basidiospores and yeast cells. 5. Basidiospores showing yeast-like budding (above) and germination by hypha (below). 6. TEM micrograph of a median section of a basidiospore. Note the splitting of the cell wall of one side of the apiculus (arrow). Bar equals 2 µm.

Long Pg tie to Fig



FIGS. 7–10. *Syzygospora alba*. 7. Hyphal context of the inner part of the basidiocarp; hyphae of the parasite connected to the host cells with tremelloid haustoria. 8. Part of the hymenium with different stages of basidial development, and basidiospores. 9. Apical parts of basidia with young basidiospores. 10. Apical details of mature basidia with central figure showing a partial septum.

That Pg due to Fig.



FIGS. 11–14. *Syzygospora alba*. 11. Conidiophores with different stages of zygoconidium formation. 12. Conidiophore (arrow) showing connection with haustoria and collapsed basidia (from holotype of *Syzygospora alba*, Martin 2167). 13. Conidiophores and conidia (Martin 2167). 14. Young conidiophores with haustoria (Martin 2167).

termixed with small, thin-walled hyphae which obviously represent young developmental stages. These hyphae sometimes branch to form lateral haustoria. It appears that the hymenium is thickened by hyphal proliferation below the basidia. All hyphae in the hymenium and at the bases of the basidia are septate at the locus of clamp connections. The basidiospores are hyaline, depressed and drop-like (FIG. 3), 9–11 × 6–8 µm, asymmetrically apiculate (FIG. 6), the walls thin, smooth, and non-amyloid.

Germinating basidiospores showed predominantly a yeast-like

I Hine Hung

budding of the *Tremella* type (FIGS. 4, 5). Rarely, germination by hyphal formation could also be observed (FIG. 5). We do not know whether or not secondary spores are produced. In all known collections, conidial formation is very striking and is apparently the only propagative state in special developmental stages of the fruiting bodies. Short-celled conidiophores produce two terminal cells that simultaneously begin to form opposed beak-like outgrowths (FIGS. 11, 13, 14). The outgrowths extend to globose bodies that fuse to form a one-celled conidium that finally becomes detached. The conidiogenous cells are capable of repeated conidium formation around the circumference of the transverse septum separating the cells. The conidiophore-bearing hyphae proliferate strongly to form successive conidiophores. An immense quantity of conidia is produced, and these are distributed over the outer and inner surfaces of the fruiting body.

In addition to examination with the light microscope, we also studied the fungus with the transmission electron microscope. Surprisingly, the herbarium material, though several years old, yielded successful results when prepared for ultrastructural study. Two septal pore types are present, both with dolipore structures. Many dolipores, however, seem to be without parenthesomes, as in the septal pores of *Filobasidium floriforme* L. Olive (Moore and Kreger van Rij, 1972) and *Filobasidiella neoformans* Kwon-Chung (Kwon-Chung and Popkins, 1976). Because they are present in the hymenial region, we are convinced that these dolipores belong to the hyphae of *Syzygospora alba*. In basal portions of the basidiocarp, on the other hand, the second dolipore type with perforated parenthesomes can also be found. We are fully aware of the difficulties of studying ultrastructural details in old herbarium material. However, some of the structures revealed are quite significant and useful in understanding the taxonomic relationships of this fungus.

The parasite produces hyphae that are thin-walled and clamped (FIG. 7), therefore the host must be a basidiomycete, but because of the paucity of additional characteristics a more detailed interpretation of the host cannot now be given. To our knowledge, *Syzygospora alba* is presently known only from six collections from Panama and one collection from Mexico.

DISCUSSION

The genus *Syzygospora* was erected by Martin in 1937 to describe the species *Syzygospora alba*. This fungus is characterized by the formation of paired blastogenous cells that fuse and are released from the supporting hyphae (FIGS. 11, 12). Martin (1937) interpreted this struc-

ture as a special type of auriculariaceous basidium. However, in a restudy of the species by Kao (1956), it was shown that the unusual structures were conidia and that the conidiophores were connected with generative hyphae that produce holobasidia. This can now be confirmed by our investigations. Furthermore, Kao elucidated nuclear behavior during conidium formation. She indicated that the primary outgrowths of the conidiogenous cells are uninucleate, and after fusion, a dikaryotic conidium is formed. In a study of *Christiansenia pallida* Hauerslev, Boidin (1970) demonstrated that conidium formation in this species is essentially similar to that found in the fungus under consideration. Because of the unique development, he proposed the term "zygoconidium" for the propagule.

After a detailed discussion, Boidin (1970) accepted the interpretation of Donk (1962) to consider the name *Syzygospora* as a "nomen anamorphosis." It seems obvious that Martin (1937) assigned the basidial stage to the anamorph in his description. However, in the type material the true teleomorph is also present. Figure 1a of Martin's (1937) illustration shows a young basidium and not a cystidium, as Boidin (1970) already correctly reinterpreted this figure. Our study of a holotype specimen (Martin 2167) confirms that collapsed basidia are connected with the conidiophore-bearing hyphae (FIG. 12). In another holotype (Martin 2517) Boidin (1970) found several basidiospores intermixed with innumerable conidia. Our study shows that anamorphs and teleomorphs can be present in the same fruiting body. Because the same condition is found in the type material, we are inclined to accept the interpretation of Art. 59 of the Nomenclatural Code in the sense of Weresub et al. (1974), ". . . that the application of a name is determined by its type material." We consequently propose to use the name *Syzygospora alba* Martin for the teleomorph and the holomorph of this fungus. Therefore, we cannot accept the nomenclatorial transfer of the species to "*Christiansenia alba* Boidin ex Martin" (Boidin, 1970). On the other hand, it seems justified to accept *Christiansenia* (Hauerslev, 1969) as a separate genus mainly because of the very different fruiting body morphology. We are unable at present to assess the generic value of the different characteristics of the basidia and of basidiospore germination types.

ACKNOWLEDGMENTS

The late Dr. G. W. Martin provided the holotype material used in this study. We are grateful to Dr. G. Guzmán for sending the specimen of *Syzygospora alba* from Mexico.

LITERATURE CITED

Bandoni, R. J. 1961. The genus *Naematelia*. *Amer. Midl. Naturalist* **66**: 319–328.

Boidin, J. 1970. Homobasidiomycètes resupinés et Héterobasidiomycètes saprophytes: XII. Le genre *Christiansenia* Hauerslev 1969. *Bull. Mens. Soc. Linn. Lyon* **39**: 132–137.

Donk, M. A. 1962. The generic names proposed for Hymenomycetes. XII, Deuteromycetes. *Taxon* **13**: 75–104.

Hauerslev, K. 1969. *Christiansenia pallida* gen. nov. A new parasitic Homobasidiomycete from Denmark. *Friesia* **9**: 43–45.

Kao, C. J. 1956. The cytology of *Syzygospora alba*. *Mycologia* **48**: 677–684.

Kwon-Chung, K. J., and T. J. Popkin. 1976. Ultrastructure of septal complex in *Filobasidiella neoformans (Cryptococcus neoformans)*. *J. Bacteriol.* **126**: 524–528.

Lowy, B. 1964. A new genus of the Tulasnellaceae. *Mycologia* **56**: 696–700.

Martin, G. W. 1937. A new type of heterobasidiomycete. *J. Wash. Acad. Sci.* **27**: 112–114.

Moore, R. T., and N. J. W. Kreger-van Rij. 1972. Ultrastructure of *Filobasidium* Olive. *Canad. J. Microbiol.* **18**: 1949–1951.

Olive, L. S. 1957. Two new genera of the Ceratobasidiaceae and their phylogenetic significance. *Amer. J. Bot.* **44**: 429–435.

Spurr, A. R. 1969. A low-viscosity epoxid embedding medium for electron microscopy. *J. Ultrastruct. Res.* **26**: 31–43.

Weresub, L. K., D. Malloch, and K. A. Pirozynski. 1974. Response to Hawksworth & Sutton's proposals for Art. 59. *Taxon* **23**: 569–578.

Accepted for publication June 22, 1981

MYCOLOGIA

Instructions for Proofs and Page Charges

Proofs: Please read the enclosed proof carefully, making only absolutely necessary changes, and return promptly. Author's will be charged for alterations where warranted. Mark on the margin of the proof where figures, tables, etc., if any, should be inserted. Also, indicate clearly if there are places where additions (page numbers, incomplete references, etc.) will have to be made by the editor in page proof. Do not return your artwork unless it is necessary to remake an engraving.

Your manuscript will be discarded upon publication unless you notify us to return it.

Page charges: The enclosed page charge form must be completed and **returned with the galley proofs to:**

Publications Office,
New York Botanical Garden,
Bronx, N. Y. 10458.

DO NOT INCLUDE REPRINT ORDER—see below

Instructions for ordering reprints

Please note that reprints are ordered directly from the printer. Therefore, purchase orders for reprints should be made out to: Lancaster Press, Inc., Lancaster, Pa. 17604. However, indicate below the number of reprints desired as well as billing and shipping instructions. RETURN THIS ORDER FORM WITHIN TEN (10) DAYS to: Lancaster Press, Inc. Please do *not* include page charges on reprint purchase order.

NOTE: Postage charges will be in addition to the prices shown below.

PRICE LIST OF REPRINTS

Copies	1–4 Pages	5–8 Pages	9–12 Pages	13–16 Pages	17–20 Pages	21–24 Pages	25–28 Pages	29–32 Pages	Covers
50	20.10	41.39	61.96	82.86	104.62	124.26	144.75	165.65	21.64
100	22.70	45.25	68.41	90.51	113.61	135.71	158.79	180.96	27.95
Add'l 100's	5.19	7.66	12.85	15.31	17.91	22.89	28.08	30.61	12.65

= $93.51

For 500 copies deduct 5%; for 1000 or more deduct 10%.

For more than 32 pages add cost per schedule to make total. Example: for 44 pages add cost for 32 pages and 12 pages.

Note: For any reprints requiring additional composition or changes, either in text or cover, an extra charge will be made.

REPRINT ORDER FOR ARTICLE BY: F. Oberwinkler and B. Lowy
(Authors)

Article Title Syzygospora alba, a mycoparasitic Heterobasidiomycete

To estimate the number of pages in your article, multiply the number of galleys by 3.

Total number ordered ..... 200 ~~Without Covers~~ / With Covers } Cross out one not wanted

Send to: DR. F. OBERWINKLER
LEHRSTUHL SPEZIELLE BOTANIK
UNIVERSITAT TUBINGEN
AUF DER MORGENSTELLE 1
D 7400 TUBINGEN 1, WEST GERMANY

DR. B. LOWY
BOTANY DEPARTMENT
LOUISIANA STATE UNIVERSITY
BATON ROUGE, LA 70803

Bill to: BOTANY DEPARTMENT
LOUISIANA STATE UNIVERSITY
BATON ROUGE, LA 70803

THE UNIVERSITY OF BRITISH COLUMBIA
2075 WESBROOK MALL
VANCOUVER, B.C., CANADA
V6T 1W5

DEPARTMENT OF BOTANY

Dr. B. Lowy
Mycology Herbarium,
Department of Botany
Louisiana State University
Baton Rouge, Louisiana 70803

Aug. 2, 1981

Dear Bernard:

Bob Bandoni and I have been examining an undescribed tulasnellaceous fungus from Hawaii which possibly is related to Pseudotulasnella. The fruiting body of the fungus is mainly conidial, but it has scattered basidia on the same hyphae as those giving rise to the conidiophores. At the moment, we are uncertain about the presence or absence of the partial septation in the basidial apex, but there is a suggestion of this in collapsed basidia. In order to be certain as to the disposition of the species, I would very much like to re-examine the type of Pseudotulasnella guatemalensis Lowy, if this is possible. I will be attending the botanical congress in Sydney, but will return to Tübingen at the end of August. Would you be willing to send the type to me for examination in Tübingen?

Appreciating again your kind cooperation.

With best regards,

Franz

Franz Oberwinkler

Department of Botany
LOUISIANA STATE UNIVERSITY AND AGRICULTURAL AND MECHANICAL COLLEGE
BATON ROUGE · LOUISIANA · 70803
504/388-8485

17-VI-1981

Dr. T. W. Johnson, Jr.
Editor-in-Chief
Department of Botany
Duke University
Durham, North Carolina 27706

Dear Terry:

Many thanks for your expeditious handling of my manuscript and for your suggestions, as well as for those of the reviewers. Several necessary and/or desirable changes have been included in the revised text which is enclosed together with your marked copy.

With best regards,

Cordially,

Bernard

B. Löwy

Syzygospora alba, a mycoparasitic Heterobasidiomycete[1]

F. Oberwinkler

Lehrstuhl Spezielle Botanik und Botanischer Garten der

Universität Tübingen, Auf der Morgenstelle 1,

D 7400 Tübingen 1, West Germany

and

B. Lowy

Department of Botany, Louisiana State University

Baton Rouge, Louisiana 70803

SUMMARY

Syzygospora alba is recognized as a mycoparasite and its anamorphs and teleomorphs are illustrated and redescribed from a recent collection from Mexico. The basidiocarps are similar to those of some species of the genus *Tremella*. Haustoria of the *Tremella* type attach to and penetrate into the basidiomycetous host cells. Holobasidia produce basidiospores capable of yeast-like budding. The dolipore septa appear to be similar to those in species of the genera *Filobasidium* and *Filobasidiella*. On the basis of these characters a heterobasidiomycetous affinity is proposed. The name *Syzygospora alba* is accepted for the holomorph of the species. It appears that this taxon is generically different from *Christiansenia pallida*.

---

[1]Part 10 in a series "Studies in Heterobasidiomycetes" of the Institut für Biologie I, University of Tübingen.

Mycoparasitism is widespread among different species of Basidiomycetes, especially of Heterobasidiomycetes. Many species of Tremella are parasitic on other fungi. The parasitic behavior is often clearly indicated by the presence of haustorial hyphae which penetrate into the host cells. In addition, the host-parasite interaction sometimes can be observed in the changed morphology of the host, as in Tremella encephala Pers. ex Pers. on Stereum sanguinolentum (A. & S. ex Fr.) Fr. (Bandoni, 1961) or Tremella aurantia Schw. on Stereum hirsutum (Willd. ex Fr.) S. F. Gray. Several of these Tremella species share a common fruiting body structure by which they can be recognized in the field.

A fungus collected by G. Guzmán in Mexico, and with the external appearance of a Tremella, was sent to us for identification. The species lacked the leading character of the Tremellaceae, viz. the cruciate-septate basidium. Therefore a more detailed study was carried out to determine the appropriate taxonomic position of the fungus.

MATERIALS AND METHODS

The following specimens are described and illustrated in the present contribution. Syzygospora alba Martin, Fungi of Panama, Prov. Chiriquí: Valley of the upper Río Chiriquí Viejo, alt. 1600-1800 m, July 1, 1935; G. W. Martin No. 2167, holotype (Herb. State Univ. Iowa, now BPI). Syzygospora alba, Mexico: Entre Los Guayabos y Las Cabanãs, 15 km al SW de Mazamitla, Carretera a Tamazula, Jalisco; bosque de Pinus-Quercus, muy perturbado, en transacción con vegetación subtropical; alt. 1700-1800 m, Agosto 24, 1974; Col. G. Guzmán, No. 11843 (Herbario de la Escuela Nacional de Ciencias Biólogicas, Instituto Politécnico Nacional, México, D.F.).

For transmission electron microscopy material was soaked in water, then fixed with glutaraldehyde and osmium tetroxide, washed with distilled water, dehydrated in an alcohol series, and embedded in ERL according to Spurr (1969). Ultrathin sections were mounted on unsupported mesh copper grids, poststained in uranyl acetate and lead citrate solutions, and examined in a Zeiss EM 9 S-2 transmission electron microscope.

RESULTS

The basidiocarps of Syzygospora alba are tremelloid and gyrose (Figs. 1, 2). This structure is apparently not or not essentially produced by gall-like, hypertrophic growth of the host. In dried specimens the fruiting bodies are brownish and have a very tough to hard-horny consistency, but may be soft-gelatinous when they are fresh. The trama consists of a layer of hyphae 2-4 µm in diam, hyaline, thin-walled, loosely branched, the branches commonly originating from clamps (Figs. 7, 8). Short, very narrow hyphal outgrowths capable of functioning as haustoria (Figs. 7, 8, 12) are formed mainly from clamp swellings. The hymenium (Fig. 8) is composed of long, apically swollen basidia (50-100 x 6-8 µm) with four curved, stout sterigmata (Figs. 9, 10), which bear asymmetrically formed basidiospores. Sometimes partly cruciate-septate basidial apices can be found (Figs. 9, 10), which appear Metabourdotia-like as described by Olive (1957), and by Lowy (1964) for Pseudotulasnella. The basidia are intermixed with small, thin-walled hyphae which obviously represent young developmental stages. These hyphae sometimes branch to form lateral haustoria. It appears that the hymenium is thickened by hyphal proliferation below the basidia. All hyphae in the hymenium and at the bases of the basidia are septate at the locus of clamp connections. The basidiospores are hyaline, depressed and drop-like (Fig. 3), 9-11 x 6-8 µm, asymmetrically apiculate (Fig. 6), the walls thin, smooth, and non-amyloid.

Germinating basidiospores showed predominantly a yeast-like budding of the Tremella type (Figs. 4, 5). Rarely, germination by hyphal formation could also be observed (Fig. 5). We do not know whether or not secondary spores are produced. In all known collections, conidial formation is very striking and is apparently the only propagative state in special developmental stages of the fruiting bodies. Short-celled conidiophores produce two terminal cells that simultaneously begin to form opposed beak-like outgrowths (Figs. 11, 13, 14). The outgrowths extend to globose bodies that fuse to form a one-celled conidium that finally becomes detached. The conidiogenous cells are capable of repeated conidium formation around the circumference of the transverse septum separating the cells. The conidiophore-bearing hyphae proliferate strongly to form successive conidiophores. An immense quantity of conidia is produced, and these are distributed over the outer and inner surfaces of the fruiting body.

In addition to examination with the light microscope, we also studied the fungus with the transmission electron microscope. Surprisingly, the herbarium material, though several years old, yielded successful results when prepared for ultrastructural study. Two septal pore types are present, both with dolipore structures. Many dolipores, however, seem to be without parenthesomes, as in the septal pores of Filobasidium floriforme L. Olive (Moore and Kreger van Rij, 1972) and Filobasidiella neoformans Kwon-Chung (Kwon-Chung and Popkins, 1976). Because they are present in the hymenial region, we are convinced that these dolipores belong to the hyphae of Syzygospora alba. In basal portions of the basidiocarp, on the other hand, the second dolipore type with perforated parenthesomes can also be found. We are fully aware of the difficulties of studying ultrastructural details

in old herbarium material. However, some of the structures revealed are quite significant and useful in understanding the taxonomic relationships of this fungus.

The parasite produces hyphae that are thin-walled and clamped (Fig. 7), therefore the host must be a basidiomycete, but because of the paucity of additional characteristics a more detailed interpretation of the host cannot now be given. To our knowledge, Syzygospora alba is presently known only from six collections from Panama and one collection from Mexico.

DISCUSSION

The genus Syzygospora was erected by Martin in 1937 to describe the species Syzygospora alba. This fungus is characterized by the formation of paired blastogenous cells that fuse and are released from the supporting hyphae (Figs. 11, 12). Martin (1937) interpreted this structure as a special type of auriculariaceous basidium. However, in a restudy of the species by Kao (1956), it was shown that the unusual structures were conidia and that the conidiophores were connected with generative hyphae that produce holobasidia. This can now be confirmed by our investigations. Furthermore, Kao elucidated nuclear behavior during conidium formation. She indicated that the primary outgrowths of the conidiogenous cells are uninucleate, and after fusion, a dikaryotic conidium is formed. In a study of Christiansenia pallida Hauerslev, Boidin (1970) demonstrated that conidium formation in this species is essentially similar to that found in the fungus under consideration. Because of the unique development, he proposed the term "zygoconidium" for the propagule.

After a detailed discussion, Boidin (1970) accepted the interpretation of Donk (1962) to consider the name Syzygospora as a "nomen anamorphosis."

It seems obvious that Martin (1937) assigned the basidial stage to the anamorph in his description. However, in the type material the true teleomorph is also present. Figure 1a of Martin's (1937) illustration shows a young basidium and not a cystidium, as Boidin (1970) already correctly reinterpreted this figure. Our study of a holotype specimen (Martin 2167) confirms that collapsed basidia are connected with the conidiophore-bearing hyphae (Fig. 12). In another holotype (Martin 2517) Boidin (1970) found several basidiospores intermixed with innumerable conidia. Our study shows that anamorphs and teleomorphs can be present in the same fruiting body. Because the same condition is found in the type material, we are inclined to accept the interpretation of Art. 59 of the Nomenclatural Code in the sense of Weresub et al. (1974), " . . . that the application of a name is determined by its type material." We consequently propose to use the name Syzygospora alba Martin for the teleomorph and the holomorph of this fungus. Therefore, we cannot accept the nomenclatorial transfer of the species to "Christiansenia alba Boidin ex Martin" (Boidin, 1970). On the other hand, it seems justified to accept Christiansenia (Hauerslev, 1969) as a separate genus mainly because of the very different fruiting body morphology. We are unable at present to assess the generic value of the different characteristics of the basidia and of basidiospore germination types.

ACKNOWLEDGMENTS

The late Dr. G. W. Martin provided the holotype material used in this study. We are grateful to Dr. G. Guzmán for sending the specimen of Syzygospora alba from Mexico.

LITERATURE CITED

Bandoni, R. J. 1961. The genus Naematelia. Amer. Midl. Naturalist 66:319-328.

Boidin, J. 1970. Homobasidiomycètes reṣupinés et Héterobasidiomycètes saprophytes: XII. Le genre Christiansenia Hauerslev 1969. Bull. Mens. Soc. Linn. Lyon 39:132-137.

Donk, M. A. 1962. The generic names proposed for Hymenomycetes. XII, Deuteromycetes. Taxon 13:75-104.

Hauerslev, K. 1969. Christiansenia pallida gen. nov. A new parasitic Homobasidiomycete from Denmark. Friesia 9:43-45.

Kao, C. J. 1956. The cytology of Syzygospora alba. Mycologia 48:677-684.

Kwon-Chung, K. J. and T. J. Popkin. 1976. Ultrastructure of septal complex in Filobasidiella neoformans (Cryptococcus neoformans). J. Bacteriol. 126:524-528.

Lowy, B. 1964. A new genus of the Tulasnellaceae. Mycologia 56:696-700.

Martin, G. W. 1937. A new type of heterobasidiomycete. J. Wash. Acad. Sci. 27:112-114.

Moore, R. T. and N. J. W. Kreger-van Rij. 1972. Ultrastructure of Filobasidium Olive. Canad. J. Microbiol. 18:1949-1951.

Olive, L. S. 1957. Two new genera of the Ceratobasidiaceae and their phylogenetic significance. Amer. J. Bot. 44:429-435.

Spurr, A. R. 1969. A low-viscosity epoxid embedding medium for electron microscopy. J. Ultrastruct. Res. 26: 31-43.

Weresub, L. K., D. Malloch, and K. A. Pirozynski. 1974. Response to Hawksworth & Sutton's proposals for Art. 59. Taxon 23:569-578.

LEGENDS TO FIGURES

Figs. 1-6. Syzygospora alba. 1. Habit sketch of dried herbarium specimen. 2. Section through a dry basidiocarp showing the gyrose morphology. 3. Mature basidiospores. 4. Budding basidiospores and yeast cells. 5. Basidiospores showing yeast-like budding (above) and germination by hypha (below). 6. TEM micrograph of a median section of a basidiospore. Note the splitting of the cell wall of one side of the apiculus (arrow). Bar equals 2 µm.

Figs. 7-10. Syzygospora alba. 7. Hyphal context of the inner part of the basidiocarp; hyphae of the parasite connected to the host cells with tremelloid haustoria. 8. Part of the hymenium with different stages of basidial development, and basidiospores. 9. Apical parts of basidia with young basidiospores. 10. Apical details of mature basidia with central figure showing a partial septum.

Figs. 11-14. Syzygospora alba. 11. Conidiophores with different stages of zygoconidium formation. 12. Conidiophore (arrow) showing connection with haustoria and collapsed basidia (from holotype of Syzygospora alba, Martin 2167). 13. Conidiophores and conidia (Martin 2167). 14. Young conidiophores with haustoria (Martin 2167).

REGISTERED NO. 72674

Value	$ NCV	Special Delivery	$ —
Reg. Fee	$ 3.00	Return Receipt	$ —
Handling Charge	$ —	Restricted Delivery	$ —
Postage	$ 2.08	☒ AIRMAIL	

POSTMASTER (By) [illegible]

POSTMARK OF MAILING OFFICE: UNIVERSITY STA. BATON ROUGE, LA. JAN 19 1981

FROM Dr. B. Lowy
Dept of Botany LSU
BR LA 70803

to Prof Dr. F. Oberwinkler Univ. Tubingen
Lehrstuhl Spezielle Botanik
Inst fur Biologie I D7400
DDR

GPO : 1977 — 237 - 902

PS Form 3806 Jan. 1977

Department of Botany
LOUISIANA STATE UNIVERSITY AND AGRICULTURAL AND MECHANICAL COLLEGE
BATON ROUGE · LOUISIANA · 70803
504/388-8485

19-I-1981

Prof. Dr. F. Oberwinkler
Universität Tübingen
Lehrstuhl Spezielle Botanik
Institut für Biologie 1
D 7400 Tübingen 1
Auf der Morgenstelle 1
DDR

Dear Franz:

I am glad to know of your continued interest in TEM/SEM studies of tremellaceous fungi, and shall gladly send you the type of Phyllogloea singeri of which you may take a fragment for your examination. I have all the type material of Neotremella which I shall eventually share with Dr. Guzman, but I prefer to take it down to Mexico personally (probably this summer) rather than risk its loss in the mail. I have had some bad experiences with the Mexican mail service. Meanwhile I am sending you a part of the rather large collection of Neotremella guzmanii Lowy for your TEM study. There is sufficient material of this, so that you may take a part of it for your herbarium.

I believe that I sent you a reprint of my Neotremella paper with the extremely poor reproductions of my photographs, the originals of which were not quite so bad!

I am awaiting the arrival of the bulk of my Amazonian collections so that I can begin examining the tremellaceous fungi, a few of which may be of special interest.

Please let me know as soon as the small package with the types reaches you.

With best regards,

Bernard

B. Lowy

UNIVERSITÄT TÜBINGEN
LEHRSTUHL SPEZIELLE BOTANIK
Institut für Biologie I
Prof. Dr. F. Oberwinkler

D 7400 Tübingen 1, January 8, 1981
Auf der Morgenstelle 1
Telefon (07071) 292610

Prof.
Dr. B. Lowy
Botany State Department
Louisiana State University
B a t o n R o u g e , L. A. 70803
U.S.A.

Dear Bernhard,

Thank you very much for your kind letter and your comments. It would be nice to join a neotropical expedition, but I am very much overloaded with duties of different kinds - also those to work on my older collections. I would be glad to go collecting once together with you and I think this would already be fantastic in the Louisiana-area, also of course somewhere in the true Neotropics.

I am grateful to you for sending Phyllogloea tremelloidea which will be sent back as soon as possible. 1 mm^3 is sufficient for our TEM-studies. Therefore it would be very nice to investigate also the type-species of the Genus, Phyllogloea singeri - if it makes no problems for you.

Thank you also for the important reprints. I did not yet know the description of "Neotremella". You can imagine that I would be very grateful to you for a study of this interesting taxon. Is the type-material in your herbarium or sent back to Dr. Guzman? If it is available I would like to ask you for a short-time loan.

I think that you have been successful during recent expedition and I look forward which interesting species you will again detect.

Cordially

Franz

Department of Botany
LOUISIANA STATE UNIVERSITY AND AGRICULTURAL AND MECHANICAL COLLEGE
BATON ROUGE · LOUISIANA · 70803
504/388-8485

26-XII-1980

Prof. Dr. F. Oberwinkler
Universität Tübingen
Lehrstuhl Spezielle Botanik
Institut für Biologie I
D 7400 Tübingen 1
Auf der Morgenstelle 1
DDR

Dear Franz:

I have just returned from a 3 month mycological expedition (Projecto Flora Amazonica) in Brasil (Acre) and have at hand your letter together with your fine drawings of the interesting Mexican holobasidiomycete of the genus Chritiansenia. It certainly merits the publication of a note, but there is nothing that I can contribute to what you have already done so well.

Regarding Phyllogloea, I am glad that you plan to do some EM or SEM studies with it. I have in my herbarium the types of P. singeri and P. tremelloidea but the entire P. crassa type I gave to Gaston Guzmán because he had originally sent it to me for identification. It was a unicate and I did not want to divide it to retain a fragment for my herbarium, although perhaps I should have done so. In any event, I now have only a phototype, a print of which I am enclosing for you. Of P. tremelloidea there is somewhat more material, and since this may serve you equally well as an example of the genus, I am sending you on loan a part of it for study. The type collection of P. singeri is a small unicate, but if you think you need it, let me know and I shall send it to you. Meanwhile, please write to me when P. tremelloidea (enclosed) has reached you safely.

With all best wishes for the New Year.

Yours,

Bernard

B. Lowy

P.S.- Have you considered joining one of the Projecto Flora expeditions? I am sure that you would find it very rewarding, and believe that Dr. Prance (Director of the Project) would gladly arrange for your participation.

REGISTERED NO. 72575

Value	$ NCV	Special Delivery	$ —
Reg. Fee	$ 3.00	Return Receipt	$ .45
Handling Charge	$ —	Restricted Delivery	$ —
Postage	$ 1.50	☐ AIRMAIL	

POSTMASTER (By) Forrest

POSTMARK OF MAILING OFFICE

UNIVERSITY STA. USPO BATON ROUGE, LA DEC 26 1980

FROM Dept. of Botany – LSU – BR – LA – 70803

TO Prof. Dr. F. Oberwinkler Universität Tübingen – Inst. für Biologie I German Democ. Rep.

GPO: 1977 — 237 - 902

PS Form 3806 Jan. 1977

UNIVERSITÄT TÜBINGEN
LEHRSTUHL SPEZIELLE BOTANIK
Institut für Biologie I
Prof. Dr. F. Oberwinkler

D 7400 Tübingen 1,
Auf der Morgenstelle 1
Telefon (07071) 292610

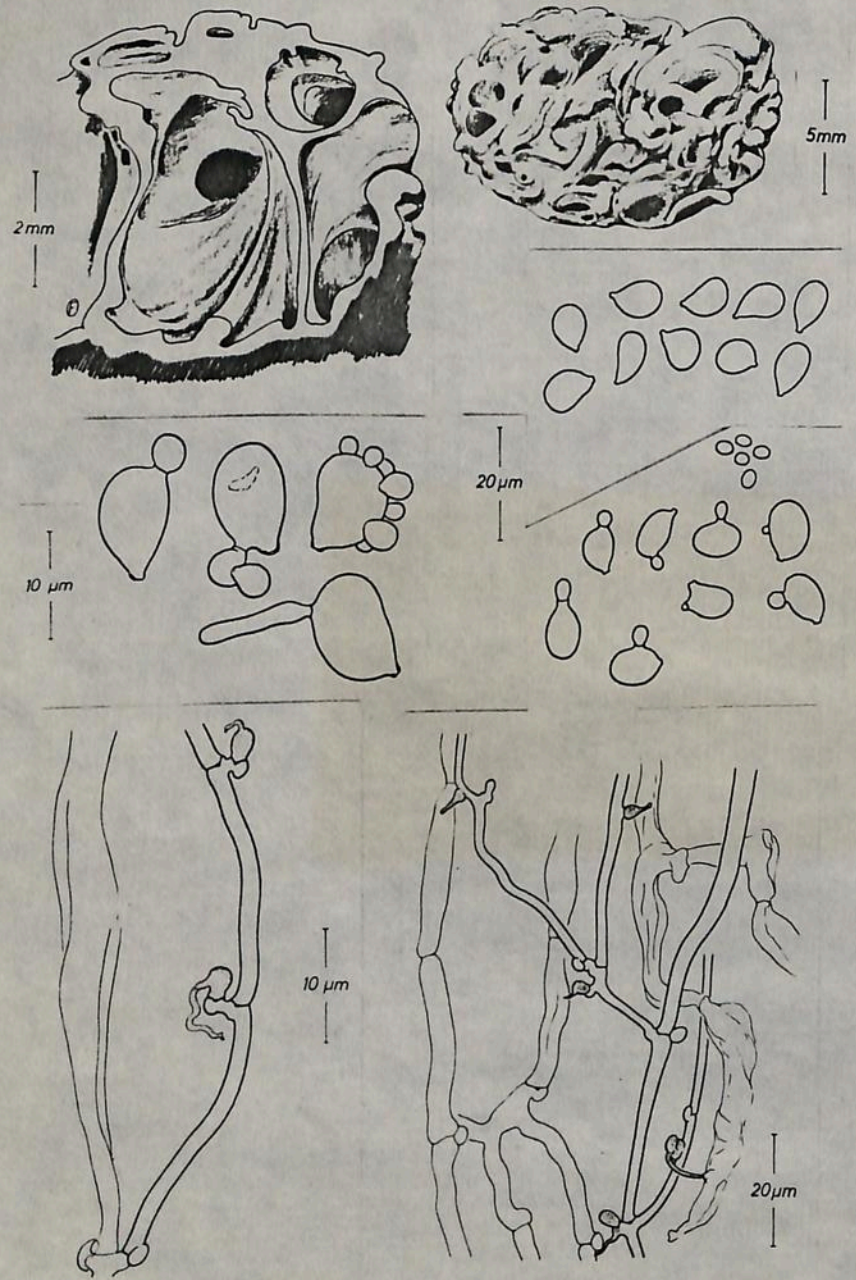
Dec.12.1980

Prof.Dr.B.Lowy
Department of Botany
Louisiana State University
Baton Rouge, Louisiana 70803
U.S.A.

Dear Bernard,

It is now two and a half years since you were sending me a tremellaceous fungus collected by Guzman in Mexico. In 1978 I indicated a possible relationship to the genus Myxomycidium. This may not be correct. Meanwhile I have studied a lot of unusual Heterobasidiomycetes and probable relatives in the so-called Aphyllophorales. I am sure now that the fungus under discussion is identic or at least closely related to Syzygospora alba Martin, a species which was transferred by Boidin (1970) in the genus Christiansenia. Enclosed you will find a xerocopy of drawings which I made from Guzman's material. There are several important characters in which this fungus deviates from the type-species of the genus Christiansenia: a) the morphology of the basidiocarp, b) spore-germination (this may be doubtful), c) structure of the basidium, d) probably there are also differences in the zygoconidium formation, but also this is still uncertain.
Anyway I think that we could publish a note on this interesting fungus on the basis of the morphological characters which are shwon in the figures. When I have a little bit more time available I will prepare a rough draft and send it to you.
Again I am very grateful to you that you have sent this material to me. - Since I am involved in comparative electronmicroscopy too, I would be grateful to you if a small part of Phyllogloea could again be available for a short time study. Surprisingly some characters of ultrastructure can be studied also from herbarium-material.
I hope that you are well up and I whish you a happy Christmas and a successful and healthy New Year.
Best regards

Franz



UNIVERSITÄT TÜBINGEN
LEHRSTUHL SPEZIELLE BOTANIK
Institut für Biologie I
Prof. Dr. F. Oberwinkler

D 7400 Tübingen 1,
Auf der Morgenstelle 1
Telefon (07071) 292610

Febr. 16, 1981

Prof. Dr. B. Lowy
Botany Department
Louisiana State University
B a t o n R o u g e L.A. 70803
U.S.A.

Dear Bernhard,

I am very grateful to you for having sent the type-collections of Neotremella guzmanii and Phyllogloea singeri. The material arrived in a good condition and I will send it back within a short time. Also I will inform you then what we could find by our TEM-studies.

With best regards

Franz

UNIVERSITÄT TÜBINGEN
INSTITUT FÜR BIOLOGIE I
Lehrstuhl Spezielle Botanik
Prof. Dr. F. Oberwinkler

D 7400 Tübingen 1,
Auf der Morgenstelle 1
Telefon (07071) 292610

June 24, 1981

Prof. Dr. B. Lowy
Botany Department
Louisiana State University
B a t o n R o u g e L.A. 70803
U.S.A.

Dear Bernhard,

Thank you very much for sending the final version of our joint paper and for submitting it to Mycologia. Just at this moment I received also your letter which indicates that the paper has been accepted for publication. This was apparently a very rapid procedure. I am grateful to you for managing all these official things with the editor of Mycologia. I have still not sufficient experience in doing this adequately with manuscripts in a foreign language.

I think that 100 reprints for each of us would be enough. Also I accept your kind offer that the payment of the reprints will be done by your Department. I hope that there will be another chance of cooperation in which case we should take care of the financial support.

With kindest regards,

Franz

Department of Botany
LOUISIANA STATE UNIVERSITY AND AGRICULTURAL AND MECHANICAL COLLEGE
BATON ROUGE · LOUISIANA · 70803
504/388-8485

19-VI-1981

Dear Franz,

A few additional changes in format were suggested by the editor, so that the final version of the paper is the one here enclosed. Although the alterations are minor, they were made in order to conform with the current style of Mycologia.

as always,

Bernard

Department of Botany
LOUISIANA STATE UNIVERSITY AND AGRICULTURAL AND MECHANICAL COLLEGE
BATON ROUGE · LOUISIANA · 70803
504/388-8485

15-VI-1981

Dr. Franz Oberwinkler
Lehrstuhl Spezielle Botanik
Universität Tübingen
Auf de Morgenstelle 1
D 7400 Tübingen 1, DDR

Dear Franz:

Dr. Johnson has just informed me of the acceptance of our paper for MYCOLOGIA and he also tells me that he will try to include it in the Nov.-Dec. (1981) issue of the journal.

If it meets with your approval, I shall order 100 reprints with covers for each of us. In order to expedite and simplify payment of reprints to the printer, I shall request that this be made by my Department, which is a routine matter and you therefore need not ask your Department for these funds. However, if you would like to have more than 100 reprints please let me know, and I shall order the number that you request.

With kindest regards,

Bernard

Department of Botany
LOUISIANA STATE UNIVERSITY AND AGRICULTURAL AND MECHANICAL COLLEGE
BATON ROUGE · LOUISIANA · 70803
504/388-8485

May 15, 1981

Dr. F. Oberwinkler
Lehrstuhl Spezielle Botanik
Universität Tübingen
Auf der Morgenstelle 1
D 7400 Tübingen 1, DDR

Dear Franz,

You will find enclosed a xerox copy of the final version of the paper which I have just submitted to MYCOLOGIA. The editorial changes that I previously indicated, and which you approved, have now been incorporated, together with a few other alterations made largely for the purpose of style. I also added a phrase on p. 3 of the manuscript (lines 4 and 5 from the bottom of the page) indicating that Olive and I had previously observed partially septate basidia both in Metabourdotia and in Pseudotulasnella, and I have therefore included the corresponding references in the bibliography.

Since there is now approximately a 6 month lag in the interval between submitting a paper to MYCOLOGIA and its publication, I expect that this will probably appear in the Jan.-Feb. 1982 issue. It is normal procedure for the editor of MYCOLOGIA to send a paper to two reviewers for criticism, a process that may take about 3 weeks. Although I do not anticipate the need for changes in this manuscript, within about a month from now the editor should let me know whether the reviewers have suggested any significant alterations.

Since MYCOLOGIA publishes only in English, the German summary will be deleted.

Once again I thank you for your kindness in suggesting that this paper be submitted under joint authorship, and I share your desire for our continued collaboration in the future.

With all best wishes,

Bernard

All Entries MUST be in Ball Point Pen or Typed

REGISTERED NO. 73932

POSTMARK OF MAILING OFFICE

UNIVERSITY STA. BATON ROUGE, LA. 15 1981

POST OFFICE COMPLETION

Reg. Fee	$ 3.25	Special Delivery	$
Handling Charge	$	Return Receipt	$
Postage	$ 2.30	Restricted Delivery	$

RECEIVED BY MLG

AIRMAIL X

CUSTOMER COMPLETION (Please Print)

FULL VALUE $ NONE

FROM
Dr. B Lowy
B. R. L9
L S U
ZIP CODE 70893

TO
Universitat Tubingen
AUF DER Morgenstelle
D7400 Tubingen West Germany
ZIP CODE

PS FORM 3806 Sept. 1979 RECEIPT FOR REGISTERED MAIL (Customer Copy)

UNIVERSITÄT TÜBINGEN
INSTITUT FÜR BIOLOGIE I
Lehrstuhl Spezielle Botanik
Prof. Dr. F. Oberwinkler

D 7400 Tübingen 1,
Auf der Morgenstelle 1
Telefon (07071) 292610

May 7, 1981

Prof. Dr. B. Lowy
Louisiana State University
Botany Department
B a t o n R o u g e L.A.70803
U.S.A.

Dear Bernhard,

Thank you very much for quickly reviewing the manuscript on "Syzygospora" and making comments; in which I fully agree. Again, I would like to express that I am grateful for sending Guzman's collection to me, - which after quite a long time finally could be used for a better understanding of Syzygospora.

For submitting the manuscript I would like to ask you whether we could handle it like this that the version which should be submitted is retyped in your institute. If necessary, minor linguistic changes could then still be done.

Also I would like to ask you if you can submit the paper to Mycologia because you are much more familiar with all formal things which are necessary in this case. Therefore I add again the original of the plates.

When the above proposal can be realized, I would be grateful to receive a copy of the submitted version.

It would be nice to further continue our cooperation.

With best regards

Franz

Syzygospora alba Martin, a mycoparasitic Heterobasidiomycete[1]

F. Oberwinkler

Lehrstuhl Spezielle Botanik und Botanischer Garten der

Universität Tübingen, Auf der Morgenstelle 1,

D 7400 Tübingen 1, West Germany

and

B. Lowy

Department of Botany, Louisiana State University

Baton Rouge, Louisiana 70803

SUMMARY

Syzygospora alba Martin is recognized as a mycoparasite and its ana- and teleomorphs are illustrated and redescribed from a recent collection from Mexico. The basidiocarps are similar to those of some species of the genus *Tremella*. Haustoria of the *Tremella* type attach to and penetrate into the basidiomycetous host cells. Holobasidia produce basidiospores capable of yeast-like budding. The dolipore structures appear to be similar to those in species of the genera *Filobasidium* and *Filobasidiella*. On the basis of these characters a heterobasidiomycetous affinity is proposed. The name *Syzygospora alba* is accepted for the holomorph of the species. It appears that this taxon is generically different from *Christiansenia pallida* Hauerslev.

---

[1]Part 10 in a series "Studies in Heterobasidiomycetes" of the Institut für Biologie I, University of Tübingen.

INTRODUCTION

Mycoparasitism is widespread among different species of Basidiomycetes, especially of Heterobasidiomycetes. Many species of Tremella are parasitic on other fungi. The parasitic behavior is often clearly indicated by the presence of haustorial hyphae which penetrate into the host cells. In addition, sometimes the host-parasite interaction can be observed in the changed morphology of the host, as in Tremella encephala Pers. ex Pers. on Stereum sanguinolentum (A. & S. ex Fr.) Fr. (Bandoni 1961) or Tremella aurantia Schw. on Stereum hirsutum (Willd.ex Fr.) S.F. Gray. Several of these Tremella species share a common fruiting body structure by which they can be recognized in the field.

A fungus collected by G. Guzmán in Mexico, and with the external appearance of a Tremella, was sent to us for identification. The species turned out, however, to lack the leading character of the Tremellaceae, viz. the cruciate-septate basidium. Therefore a more detailed study was carried out to determine the appropriate taxonomic position of the fungus.

MATERIALS AND METHODS

The following specimens are described and illustrated in the present contribution. Syzygospora alba Martin, Fungi of Panama, Prov. Chiriquí: Valley of the upper Río Chiriquí Viejo, alt. 1600-1800 m, July 1, 1935; G.W. Martin No. 2167, co-type (Herb. State Univ.Iowa, now BPI). Syzygospora alba Martin, Mexico: Entre Los Guayabos y Las Cabañas, 15 km al SW de Mazamitla, Carretera a Tamazula, Jalisco; bosque de Pinus-Quercus, muy perturbado, en transacción con vegetación subtropical; alt. 1700-1800 m, Agosto 24, 1974; Col. G. Guzmán, No. 11843 (Herbario de la

Escuela Nacional de Ciencias Biólogicas, Instituto Politécnico Nacional, México, D.F.).

For transmission electron microscopy material was soaked in water, then fixed with glutaraldehyde and osmium tetroxide, washed with distilled water, dehydrated in an alcohol series and embedded in ERL according to Spurr (1969). Ultrathin sections were mounted on unsupported mesh copper grids, poststained in uranyl acetate and lead citrate solutions, and examined in a Zeiss EM 9 S-2 transmission electron microscope.

RESULTS

The basidiocarps of Syzygospora alba are tremelloid and gyrose (Figs. 1,2). This structure is apparently not or not essentially produced by gall-like, hypertrophic growth of the host. In dried specimens the fruiting bodies are brownish and have a very tough to hard-horny consistency, but may be soft gelatinous when they are fresh. The trama consists of a layer of hyphae 2-4 µm in diam, hyaline, thin walled, loosely branched, the branches commonly originating from clamps (Figs. 7,8). Short, very narrow hyphal outgrowths capable of functioning as haustoria (Figs. 7,8,12) are formed mainly from clamp swellings. The hymenium (Fig. 8) is composed of long, apically swollen basidia (6-8 x 50-100 µm) with four curved, stout sterigmata (Figs. 9,10) which bear asymmetrically formed basidiospores. Sometimes partly cruciate-septate basidial apices can be found (Figs. 9,10) which appear Metabourdotia-like as described by Olive (1957), and by Lowy (1964) for Pseudotulasnella. The basidia are intermixed with small, thin walled hyphae which obviously represent young developmental stages in basidial ontogeny. These hyphae sometimes branch to form lateral haustoria. It appears that the hymenium is thickened by hyphal proliferation below the basidia. All hyphae in the

hymenium and at the bases of the basidia are septate at the locus of clamp connections. The basidiospores are hyaline, depressed and drop-like (Fig. 3), 6-8 x 9-11 µm, asymmetrically apiculate (Fig. 6), the walls thin, smooth, and non-amyloid.

Those basidiospores which were germinating showed predominantly a yeast-like budding of the Tremella type (Figs. 4,5). Rarely germination by hyphal formation could also be observed (Fig. 5). We do not know whether or not secondary spores are produced. In all known collections, conidial formation is very striking and is apparently the only propagative state in special developmental stages of the fruiting bodies. Short-celled conidiophores produce two terminal cells which simultaneously begin to form opposed beak-like outgrowths (Figs. 11,13,14). The outgrowths extend to globose bodies which fuse to form a one-celled conidium that finally breaks off the conidiophore. The conidiogenous cells are capable of repeated conidium formation around the circumference of the transverse septum separating the cells.

The conidiophore-bearing hyphae proliferate strongly to form successive conidiophores. An immense quantity of conidia is produced, and these are distributed over the outer and inner surfaces of the fruiting body. In addition to examination with the light microscope we also studied the fungus with the transmission electron microscope. Surprisingly the several years old herbarium material yielded successful results when prepared for ultrastructural study. Two septal pore types are present, both with dolipore structures. Many dolipores, however, seem to be without parenthesomes, as in the septal pores of Filobasidium floriforme L. Olive (Moore & Kreger van Rij 1972) and Filobasidiella neoformans Kwon-Chung (Kwon-Chung &

Popkins 1976). Because they are present in the hymenial region, we are convinced that these dolipores belong to the hyphae of Syzygospora alba. In basal portions of the basidiocarp, on the other hand, the second dolipore type with perforated parenthesomes can also be found. We are fully aware of the difficulties of studying ultrastructural details in old herbarium material. However, some of the structures revealed are quite significant and useful in understanding the taxonomic relationships of this fungus.

The parasite grows in hyphae which are thin walled and clamped (Fig. 7), therefore the host must be a basidiomycete, but because of the paucity of additional characteristics a more detailed interpretation of the host cannot now be given. To our knowledge, Syzygospora alba is presently known only from six collections from Panama and one collection from Mexico.

DISCUSSION

The genus Syzygospora was erected by Martin in 1937 to describe the species Syzygospora alba. This fungus characterized by the formation of paired blastogenous cells which fuse and are released from the supporting hyphae (Figs. 11,12). Martin (l.c.) interpreted this structure as a special type of auriculariaceous basidium. However, in a restudy of the species by Kao (1956), it was shown that the unusual structures were conidia and that the conidiophores were connected with generative hyphae that produce holobasidia. This can now be confirmed by our investigations. Futhermore, Kao elucidated nulcear behavior during conidium formation. He indicated that the primary outgrowths of the conidiogenous cells are uninucleate, and after fusion, a dikaryotic conidium is formed. In a study of Christiansenia pallida Hauerslev, Boidin (1970) was able to demonstrate that conidium

formation in this species is essentially similar. Because of the unique development, he proposed the term "zygoconidium" for the propagule.

After a detailed discussion, Boidin (l.c) accepted the interpretation of Donk (1962) to consider the name Syzygospora as a "nomen anamorphosis." It seems obvious that Martin (1937) assigned the basidial stage to the anamorph in his description. However, in the type material the true teleomorph is also present. Fig.1a of Martin's illustration shows a young basidium and not a cystidium, as Boidin (1970) already correctly reinterpreted this figure. Our study of a co-type specimen (Martin 2167) confirms that collasped basidia are connected with the conidiophore-bearing hyphae (Fig. 12). In another co-type (Martin 2517) Boidin (l.c.) found several basidiospores intermixed with innumerable conidia. Our study shows that ana- and teleomorphs can be present in the same fruiting body. Because of the same condition found in the type material we are inclined to accept the interpretation of Art. 59 of the Nomenclatural Code in the sense of Weresub et al. (1974), "...that the application of a name is determined by its type material." We consequently propose to use the name Syzygospora alba Martin for the teleomorph and the holomorph of this fungus. Therefore we cannot accept the nomenclatorial transfer of the species to "Christiansenia alba Boidin ex Martin" (Boidin 1970). On the other hand it seems justified to accept Christiansenia (Hauerslev 1969) as a separate genus mainly because of the very different fruiting body morphology. We are unable at present to assess the generic value of the different characteristics of the basidia, and of basidiospore germination types.

ACKNOWLEDGMENTS

The late Dr. G.W. Martin provided the co-type material used in this study. We are grateful to Dr. G. Guzmán for sending the specimen of Syzygospora alba from Mexico.

LITERATURE CITED

Bandoni, R.J. 1961. The genus Naematelia. Am. Midl. Nat. 66: 319-328.

Boidin, J. 1970. Homobasidiomycètes résupinés et Hétérobasidiomycètes saprophytes: XII. - Le genre Christiansenia Hauerslev 1969. Bull. Soc. Linn. Lyon 39: 132-137.

Donk, M.A. 1962. The generic names proposed for Hymenomycetes. XII, Deuteromycetes. Taxon. 13: 75-104.

Hauerslev, K. 1969. Christiansenia pallida gen. nov. A new parasitic Homobasidiomycete from Denmark. Friesia 9: 43-45.

Kao, C.J. 1956. The cytology of Syzygospora alba. Mycologia 48: 677-684.

Kwon-Chung, K.J. & T.J. Popkin. 1976. Ultrastructure of septal complex in Filobasidiella neoformans (Cryptococcus neoformans). J. Bacteriol. 126: 524-528.

Lowy, B. 1964. A new genus of the Tulasnellaceae. Mycologia 56: 696-700.

Martin, G.W. 1937. A new type of heterobasidiomycete. Washington Acad. Sci. 27: 112-114.

Moore, R.T. & N.J.W. Kreger-van Rij. 1972. Ultrastructure of Filobasidium Olive. Can. J. Microbiol. 18: 1949-1951.

Olive, L.S. 1957. Two new genera of the Ceratobasidiaceae and their phylogenetic significance. Amer J. Bot. 44: 429-435.

Spurr, A.R. 1969. A low-viscosity epoxid embedding medium for electron microscopy. J. Ultrastruct. Res. 26: 31-43.

Weresub, L.K., D. Malloch & K.A. Pirozynski. 1974. Response to Hawksworth & Sutton's proposals for Art. 59. Taxon 23: 569-578.

LEGENDS TO FIGURES

Plate I

Fig. 1. Habit sketch of dried herbarium specimen. Fig. 2. Section through a dry basidiocarp showing the gyrose morphology. Fig. 3. Mature basidiospores. Fig.4. Budding basidiospores and yeast cells. Fig. 5. Basidiospores showing yeast-like budding (above) and germination by hypha (below). Fig. 6. TEM micrograph of a median section of a basidiospore. Note the splitting of the cell wall of one side of the apiculus (arrow). Bar equals 2 μm.

Plate II

Fig. 7. Hyphal context of the inner part of the basidiocarp; hyphae of the parasite connected to the host cells with tremelloid haustoria. Fig. 8. Part of the hymenium with different stages of basidial development, and basidiospores. Fig. 9. Apical parts of basidia with young basidiospores. Fig. 10. Apical details of mature basidia with central figure showing a partial septum.

Plate III

Fig. 11. Conidiophores with different stages of zygoconidium formation. Fig. 12. Conidiophore (arrow) showing connection with haustoria and collapsed basidia (from co-type of Syzygospora alba, Martin 2167). Fig. 13. Condiophores and conidia (Martin 2167). Fig. 14. Young conidiophores with haustoria (Martin 2167).

copy to Franz generous margins Revised by BL

Syzygospora alba Martin, a mycoparasitic Heterobasidiomycete [1]

by

F. Oberwinkler [2] and B. Lowy [3]

footnote

1) Part 10 in a series "Studies in Heterobasidiomycetes" of the Institut für Biologie I, University of Tübingen.

2) Lehrstuhl Spezielle Botanik und Botanischer Garten der Universität Tübingen, Auf der Morgenstelle 1, D 7400 Tübingen 1, West Germany.

3) Department of Botany, Louisiana State University, Baton Rouge, Louisiana 70803.

Summary; caps. → SUMMARY

Syzygospora alba Martin is recognized as a mycoparasite and its ana- and teleomorphs are illustrated and redescribed from a recent collection from Mexico. The basidiocarps are similar to those of some species of the genus Tremella. Haustoria of the Tremella-type attach to and penetrate into the basidiomycetous host-cells. Holobasidia produce basidiospores capable of yeast-like budding. The dolipore structures appear to be similar to those in species of the genera Filobasidium and Filobasidiella. On the basis of these characters a heterobasidiomycetous ~~relationship~~ affinity is proposed. The name of Syzygospora alba is accepted for the holomorph of the species. It appears that this taxon is generically different from Christiansenia pallida Hauerslev.

Zusammenfassung; caps. →

Ein Beleg von Syzygospora alba Martin aus Mexico konnte ausführlich untersucht werden. Es handelt sich um eine mycoparasitische Art mit Haupt- und Nebenfruchtformen und einer Tremella-ähnlichen Fruchtkörpergestalt. Die tremelloiden Haustorien des

Parasiten dringen in die Wirtszellen eines Basidiomyceten ein. Die Art besitzt Holobasidien; ihre Basidiosporen können jedoch hefeartig knospen. Die Doliporen-Feinstruktur ist vergleichbar mit derjenigen von Arten der Gattungen Filobasidium und Filobasidiella. Syzygospora alba kann daher den Heterobasidiomyceten zugeordnet werden. Der Gattungsname wird auch für die Hauptfruchtform angenommen. Wir erachten die Sippe als gattungsverschieden von Christiansenia pallida Hauerslev.

1. Introduction

Mycoparasitism is widespread among different species of Basidiomycetes, especially of Heterobasidiomycetes. Many species of Tremella are parasitic on other fungi. The parasitic behavior is often clearly indicated by the presence of haustorial hyphae which penetrate into the host cells. In addition, sometimes the host-parasite interaction can be observed in the changed morphology of the host, as in Tremella encephala Pers. ex Pers. on Stereum sanguinolentum (A. & S. ex Fr.) Fr. (Bandoni 1961) or Tremella aurantia Schw. on Stereum hirsutum (Willd.ex Fr.) S.F.Gray. Several of these Tremella species share a common fruiting body structure by which they can be recognized in the field.

A fungus collected by G.Guzmán in Mexico, and with the external appearance of a Tremella, was sent to us for identification. The species turned out, however, to lack the leading character of the Tremellaceae, viz. the cruciate-septate basidium. Therefore a more detailed study was carried out, to determine the appropriate taxonomic position of the fungus.

2. Materials and methods

The following specimens are described and illustrated in the present contribution: Syzygospora alba Martin, Fungi of Panama, Prov.Chiriquí: Valley of the upper Río Chiriquí Viejo, alt. 1600-1800 m, July 1, 1935; G.W.Martin No.2167, co-type (Herb.State Univ. Iowa, now BPI).

Short, very narrow hyphal outgrowths capable of functioning as haustoria (Figs. 7, 8, 12) are formed mainly from clamp swellings.

(English usage: without accent)

Syzygospora alba Martin, Mexico: Entre los Guayabos y las Cabañas, 15 km al SW de Mazamitla, Carretera a Tamazula, Jalisco; bosque de Pinus-Quercus, muy perturbado, en transacción con vegetación subtropical; alt. 1700-1800 m, Agosto 24, 1974; Col. G. Guzmán, No. 11843 (Herbario de la Escuela Nacional de Ciencias Biológicas, Instituto Politécnico Nacional, México, D.F.).

(Spanish usage: with accent)

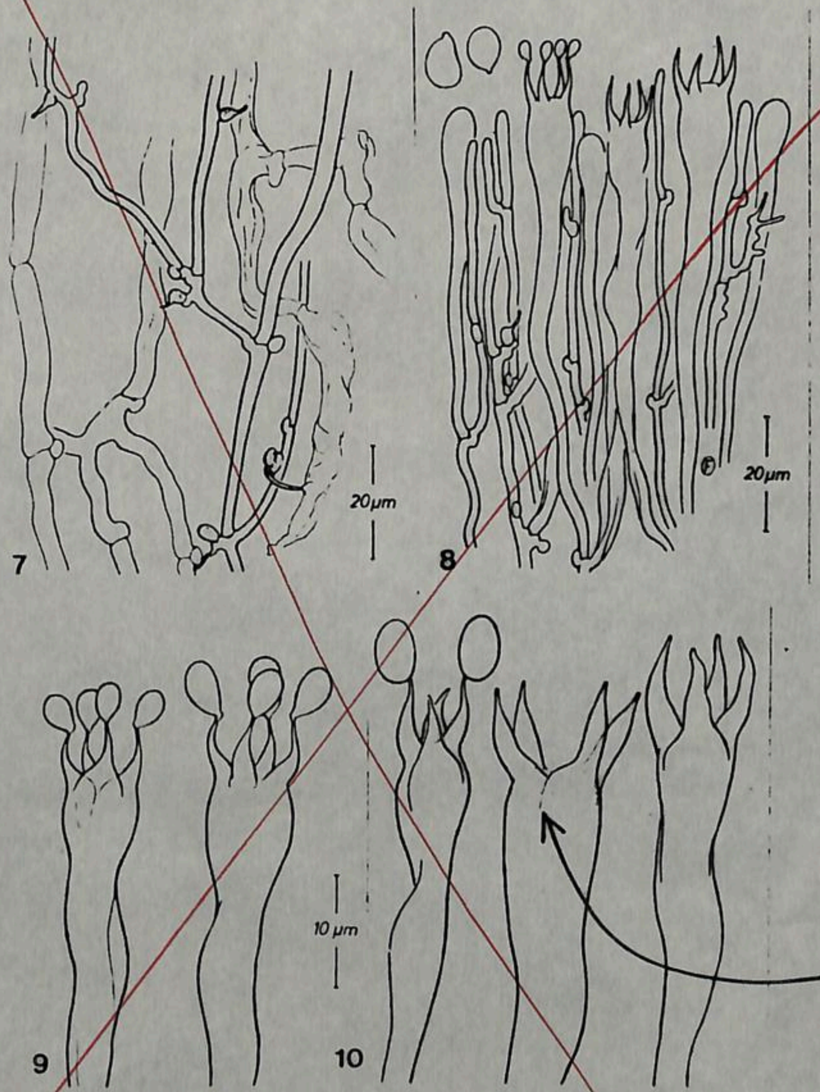
For transmission electron microscopy material was soaked in water, then fixed with glutaraldehyde and osmium tetroxide, washed with distilled water, dehydrated in an alcohol series and embedded in ERL according to Spurr (1969). Ultrathin sections were mounted on unsupported mesh copper grids, poststained in uranyl acetate and lead citrate solutions, and examined in a Zeiss EM 9 S-2 transmission electron microscope.

3. Results

Caps.

The basidiocarps of Syzygospora alba are tremelloid and gyrose (figs.1, 2). This structure is apparently not or not essentially produced by gall-like, hypertrophic growth of the host. In dried specimens the fruiting bodies are brownish and have a very tough to hard-horny consistency, but may be soft gelatinous when they are fresh. The trama consists of a layer of hyphae, the latter 2-4 µm in diam., hyaline, thin-walled, loosely branched, the branches commonly originating from clamps (figs.7, 8). Short, very narrow hyphal outgrowths are formed mainly from clamp-swellings; they are capable of functioning as haustoria (figs.7, 8, 12). The hymenium (fig.8) is composed of long, apically swollen basidia (6-8 x 50-100 µm) with four curved, stout sterigmata (figs.9, 10), and asymmetrically formed basidiospores. Sometimes partly cruciate-septate basidial apices can be found (figs.9, 10) which appear Metabourdotia-like, as described by Oliver (1957), and by Lowy (1964) for Pseudotulasnella. The basidia are intermixed with small, thin-walled hyphae which obviously represent young developmental stages in basidial ontogeny. These hyphae sometimes branch to form lateral haustoria. It appears that the hymenium is thickened by hyphal proliferation below the basidia. All hyphae in the hymenium and at the bases

PLATE II



This fragmentary, a partial septum is extremely interesting! Just as in Metabourdotia and Pseudotulasnella; also the inflated sterigmata.

Fig.7. Hyphal context of the inner part of the basidiocarp; hyphae of the parasite connected to the host-cells with tremelloid haustoria. Fig.8. Part of the hymenium with different stages of basidial development and basidiospores. Fig.9. Apical parts of basidia with young basidiospores. Fig.10. Details of old basidia.

mature?

of the basidia are septate by clamp-connections. The basidiospores are hyaline, depressed and drop-like (fig.3), 6-8 x 9-11 µm, asymmetrically apiculate (fig.6), the walls thin, smooth, non-amyloid.

Those basidiospores which were germinating show predominantly a yeast-like budding of the Tremella-type (figs.4, 5). Rarely germination by hyphae could be also observed (fig.5). We do not know whether or not secondary spores can be formed. In all known collections, conidial formation is very striking and is apparently the only propagative state in special developmental stages of the fruiting bodies. Short-celled conidiophores produce two terminal cells which simultaneously begin to form opposed beak-like outgrowths (figs.11, 13, 14). These outgrowths extend to globose bodies which fuse to form a one-celled conidium that finally breaks off the conidiophore. The conidiogenous cells are capable of repeated conidium formation around the circumference of the transverse septum separating the cells.

In addition, the conidiophore-bearing hyphae proliferate strongly to produce successive conidiophores. An immense quantity of conidia results; these are spread over the outer and inner surfaces of the fruiting body.

In addition to the examination with the light microscope we also tried to study the fungus with the transmission electronmicroscope. Surprisingly the several years old herbarium material could be used to some extent for ultrastructural characterizations. There are two septal pore types present, both with dolipore structures. Many dolipores seem not to be covered by parenthesomes as in the septal pore structure of Filobasidium floriforme L. Olive (Moore & Kreger van Rij 1972) and Filobasidiella neoformans Kwon-Chung (Kwon-Chung & Popkins 1976). Because they are present in the hymenial region, we are convinced that these dolipores belong to the hyphae of Syzygospora alba. In basal portions of the basidiocarp, on the other hand, the second dolipore type with perforated parenthesomes can also be found. We are fully aware of the difficulties in interpreting ultrastructural details from dead, several-year-old material. However, some of the structures that are still visible are important and may be used for a better understanding of the taxonomic relationships of this fungus.

The parasite is growing on hyphae which are thin-walled and clamped (fig.7); therefore the host must be a basidiomycete. Because of the lack of further characteristics a more detailed interpretation of the host cannot now be given at the moment

PLATE III

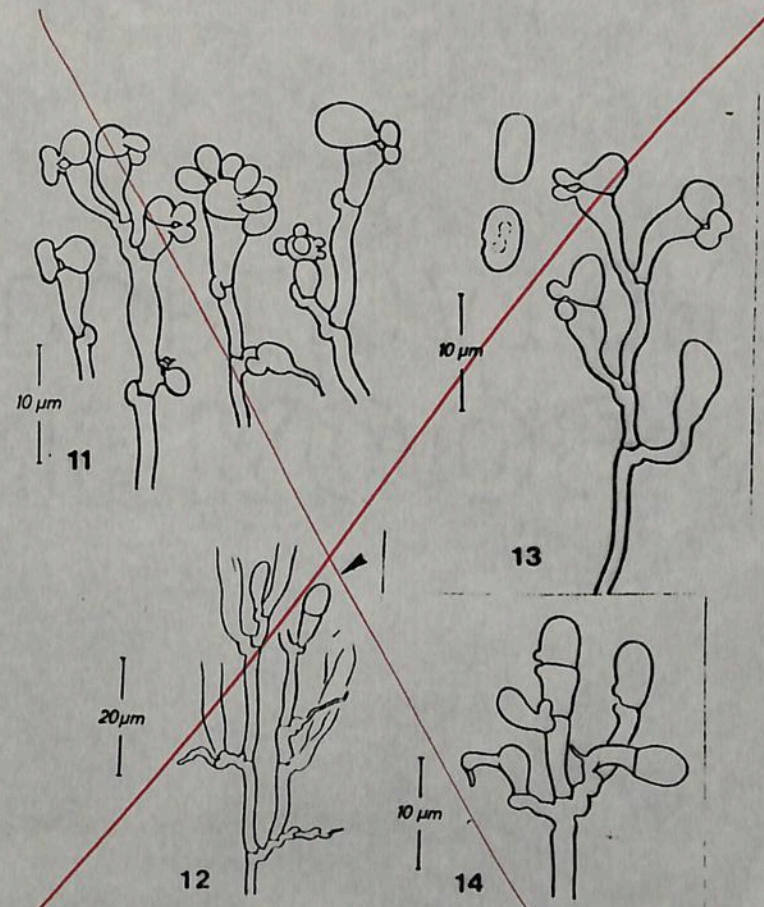


Fig.11 Conidiophores with different stages of zygoconidium formation. Fig.12 Conidiophore (arrow) showing connection with haustoria and collapsed basidia (from co-type of Syzygospora alba, Martin 2167). Fig.13 Conidiophores and conidia (Martin 2167). Fig.14 Young conidiophores connected with haustoria (Martin 2167).

To our knowledge, Syzygospora alba is presently known only from six collections from Panama and one collection from Mexico.

Case.

4. Discussion

The genus Syzygospora was erected by Martin in 1937 to describe the species Syzygospora alba. This fungus is characterized by the formation of paired blastogenous cells which fuse and are

released from the supporting hyphae (Fig. 11, 12). Martin (l.c.) interpreted this structure as a special type of auriculariaceous basidium. However, in a restudy of the species by Kao (1956), it was shown that the unusual structures were conidia and that the conidiophores were connected with generative hyphae that produce holobasidia. This can now be confirmed by our own investigations. Furthermore Kao elucidated nuclear behavior during conidium formation. He indicated that the primary outgrowths of the conidiogenous cells are uninucleate, and after the fusion, a dikaryotic conidium is formed. In a study of Christiansenia pallida Hauerslev, Boidin (1970) was able to demonstrate that the conidium formation in this species is essentially similar. Because of the unique development, he proposed the term "zygoconidium" for the propagule.

After a detailed discussion, Boidin (l.c.) accepted the interpretation of Donk (1962) to consider the name Syzygospora as a "nomen anamorphosis". It seems obvious that Martin (1937) assigned the basidial stage to the anamorph in his description. However, in the type material the true teleomorph is also present. Fig. 1 a of Martin's illustration shows a young basidium and not a cystidium, as Boidin (1970) already correctly reinterpreted this figure. Our study of a co-type specimen (Martin 2167) confirms that collapsed basidia are connected with the conidiophore-bearing hyphae (Fig. 12). In another co-type (Martin 2517) Boidin (l.c.) found several basidiospores intermixed with innumerable conidia. Our study again shows that ana- and teleomorphs can be present in the same fruiting body. Because of the same ~~situation~~ condition found in the type material we are therefore inclined to accept the interpretation of Art. 59 of the Nomenclatural Code in the sense of Weresub & al. (1974), "... that the application of a name is determined by its type material". We consequently propose to use the name Syzygospora alba Martin for the teleomorph and the holomorph of this fungus. Therefore we also cannot accept the nomenclatorial transfer of the species to "Christiansenia alba Boidin ex Martin" (Boidin 1970).

On the other hand it seems justified to accept Christiansenia (Hauerslev 1969) as a separate genus mainly because of the very different fruiting body morphology. We are unable at ~~the moment~~ present to assess the generic value of the different characteristics of the basidia, and basidiospore germination types.

5. Acknowledgements

The late Dr.G.W.Martin provided the co-type material used in this study. We are grateful to Dr.G.Guzmán for sending the specimen of Syzygospora alba from Mexico.

Literature cited

Bandoni, R.J. 1961. The genus Naematelia. Am.Midl.Nat. 66: 319-328.

Boidin, J. 1970. Homobasidiomycètes résupinés et Héterobasidiomycètes saprophytes: XII.- Le genre Christiansenia Hauerslev 1969. Bull.Soc.Linn.Lyon 39: 132-137.

Donk, M.A. 1962. The generic names proposed for Hymenomycetes. XII, Deuteromycetes. Taxon. 13: 75-104.

Hauerslev, K. 1969. Christiansenia pallida gen. nov. A new parasitic Homobasidiomycete from Danmark. Friesia 9: 43-45.

Kao, C.J. 1956. The cytology of Syzygospora alba. Mycologia 48: 677-684.

Kwon-Chung, K.J. & T.J. Popkin. 1976. Ultrastructure of septal complex in Filobasidiella neoformans (Cryptococcus neoformans). J.Bacteriol. 126: 524-528.

Martin, G.W. 1937. A new type of heterobasidiomycete. Journ. Washington Acad.Sci. 27: 112-114.

Moore, R.T. & N.J.W. Kreger-van Rij. 1972. Ultrastructure of Filobasidium Olive. Can.J.Microbiol. 18: 1949-1951.

Spurr, A.R. 1969. A low-viscosity epoxid embedding medium for electron microscopy. J.Ultrastruct.Res. 26: 31-43.

Weresub, L.K., D. Malloch & K.A. Pirozynski. 1974. Response to Hawksworth & Sutton's proposals for Art. 59. Taxon 23: 569-578.

Lowy, B. 1964. A new genus of the Tulasnellaceae. Mycologia 56: 696-700.

Olive, L. S. 1957. Two new genera of the Ceratobasidiaceae and their phylogenetic relationship significance. Amer. J. Bot. 44: 429-435.

Xerox of orginal sent to me by Franz

Syzygospora alba Martin, a mycoparasitic Heterobasidiomycete [1]

by

F. Oberwinkler [2] and B. Lowy [3]

1) Part 10 in a series "Studies in Heterobasidiomycetes" of the Institut für Biologie I, University of Tübingen.

2) Lehrstuhl Spezielle Botanik und Botanischer Garten der Universität Tübingen, Auf der Morgenstelle 1, D 7400 Tübingen 1, West Germany.

3) Department of Botany, Louisiana State University, Baton Rouge, Louisiana 70803.

Summary:

Syzygospora alba Martin is recognized as a mycoparasite and its ana- and teleomorphs are illustrated and redescribed from a recent collection from Mexico. The basidiocarps are similar to those of some species of the genus Tremella. Haustoria of the Tremella-type attach to and penetrate into the basidiomycetous host-cells. Holobasidia produce basidiospores capable of yeast-like budding. The dolipore structures appear to be similar to those in species of the genera Filobasidium and Filobasidiella. On the basis of these characters a heterobasidiomycetous relationship is proposed. The name of Syzygospora alba is accepted for the holomorph of the species. It appears that this taxon is generically different from Christiansenia pallida Hauerslev.

Zusammenfassung:

Ein Beleg von Syzygospora alba Martin aus Mexico konnte ausführlich untersucht werden. Es handelt sich um eine mycoparasitische Art mit Haupt- und Nebenfruchtformen und einer Tremella-ähnlichen Fruchtkörpergestalt. Die tremelloiden Haustorien des

Parasiten dringen in die Wirtszellen eines Basidiomyceten ein. Die Art besitzt Holobasidien; ihre Basidiosporen können jedoch hefeartig knospen. Die Doliporen-Feinstruktur ist vergleichbar mit derjenigen von Arten der Gattungen Filobasidium und Filobasidiella. Syzygospora alba kann daher den Heterobasidiomyceten zugeordnet werden. Der Gattungsname wird auch für die Hauptfruchtform angenommen. Wir erachten die Sippe als gattungsverschieden von Christiansenia pallida Hauerslev.

1. Introduction

Mycoparasitism is a widespread character of different species of Basidiomycetes, especially of Heterobasidiomycetes. Many species of Tremella are parasitic on other fungi. The parasitic behavior is often clearly indicated by the presence of haustorial hyphae which penetrate into the host-cells. In addition, sometimes the host-parasite-interaction can be observed in the changed morphology of the host, as in Tremella encephala Pers. ex Pers. on Stereum sanguinolentum (A. & S. ex Fr.) Fr. (Bandoni 1961) or Tremella aurantia Schw. on Stereum hirsutum (Willd.ex Fr.) S.F.Gray. Several of these Tremella species share a common fruiting body structure by which they can be recognized in the field.
A fungus collected by G.Guzman in Mexico, and with the external appearance of a Tremella, was sent to us for identification. The species turned out, however, to lack the leading character of the Tremellaceae, viz. the cruciate-septate basidium. Therefore a more detailed study was carried out.

2. Materials and methods

Specimens described and illustrated in the present contribution: Syzygospora alba Martin, Fungi of Panama, Prov.Chiriqui: Valley of the upper Rio Chiriqui Viejo, alt. 1600-1800 m, July 1, 1935; G.W.Martin No.2167, co-type (Herb.State Univ. Iowa, now BPI).

PLATE I

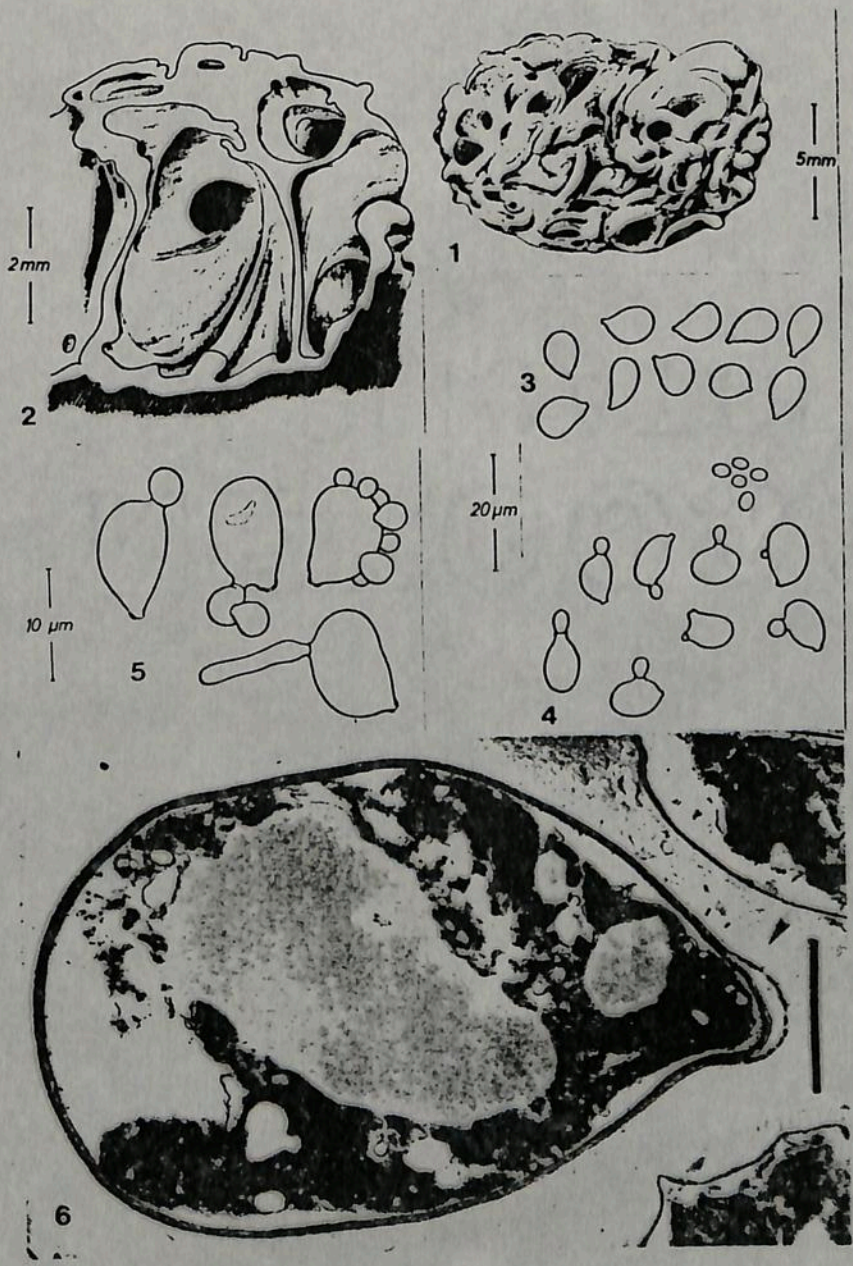


Fig.1: Habit sketch of dried herbarium specimen. Fig.2: Section through a dry basidiocarp showing the gyrose morphology. Fig.3: Mature basidiospores. Fig.4: Budding basidiospores and yeast cells. Fig.5: Basidiospores showing yeast-like budding (above) and germination by hypha (below). Fig.6: TEM-micrograph of a median section of a basidiospore; note the splitting of the cell-wall on one side of the apiculus (arrow!); barr equals 2 µm.

Syzygospora alba Martin, Mexico: Entre los Guayabos y las Cabañas, 15 km al SW de Mazamitla, Carretera a Tamazula, Jalisco; bosque de Pinus-Quercus, muy perturbado, en transacción con vegetación subtropical; alt. 1700-1800 m, Agosto 24, 1974; Col. G. Guzman, No. 11843 (Herbario de la Escuela Nacional de Sciencias Biologicas, Instituto Politecnico Nacional - Mexico, D.F.).

For transmission electron microscopy material was soaked in water, then fixed with glutaraldehyde and osmiumtetroxide, washed with distilled water, dehydrated in an alcohol series and embedded in ERL according to Spurr (1969). Ultrathin sections were mounted on unsupported mesh copper grids, poststained in uranyl acetate and lead citrate solutions, and examined in a Zeiss EM 9 S-2 Transmission electron microscope.

3. Results

The basidiocarps of Syzygospora alba are tremelloid and gyrose (figs.1, 2). This structure is apparently not or not essentially produced by gall-like, hypertrophic growth of the host. In dry specimens the fruiting bodies are brownish and have a very tough to hard-horny consistency; they may be soft gelatinous when they are fresh. The trama consists of a layer of hyphae, the latter 2-4 µm in diam., hyaline, thin-walled, loosely branched, the branches commonly originating from clamps (figs.7, 8). Short, and very narrow hyphal outgrowths are formed mainly also from clamp-swellings; they are capable of functioning as haustoria (figs.7, 8, 12). The hymenium (fig.8) is composed of long, apically swollen basidia (6-8 x 50-100 µm) with 4 curved, stout sterigmata (figs.9, 10), and asymmetrically formed basidiospores. Sometimes partly cruciate-septate basidial apices can be found (figs.9, 10) which appear Metabourdotia-like. The basidia are intermixed with small, thinwalled hyphae which obviously represent young developmental stages in basidial ontogeny. These hyphae sometimes branch to form lateral haustoria. It appears that the hymenium is thickened by hyphal proliferation below basidia. All hyphae in the hymenium and at the bases

PLATE II

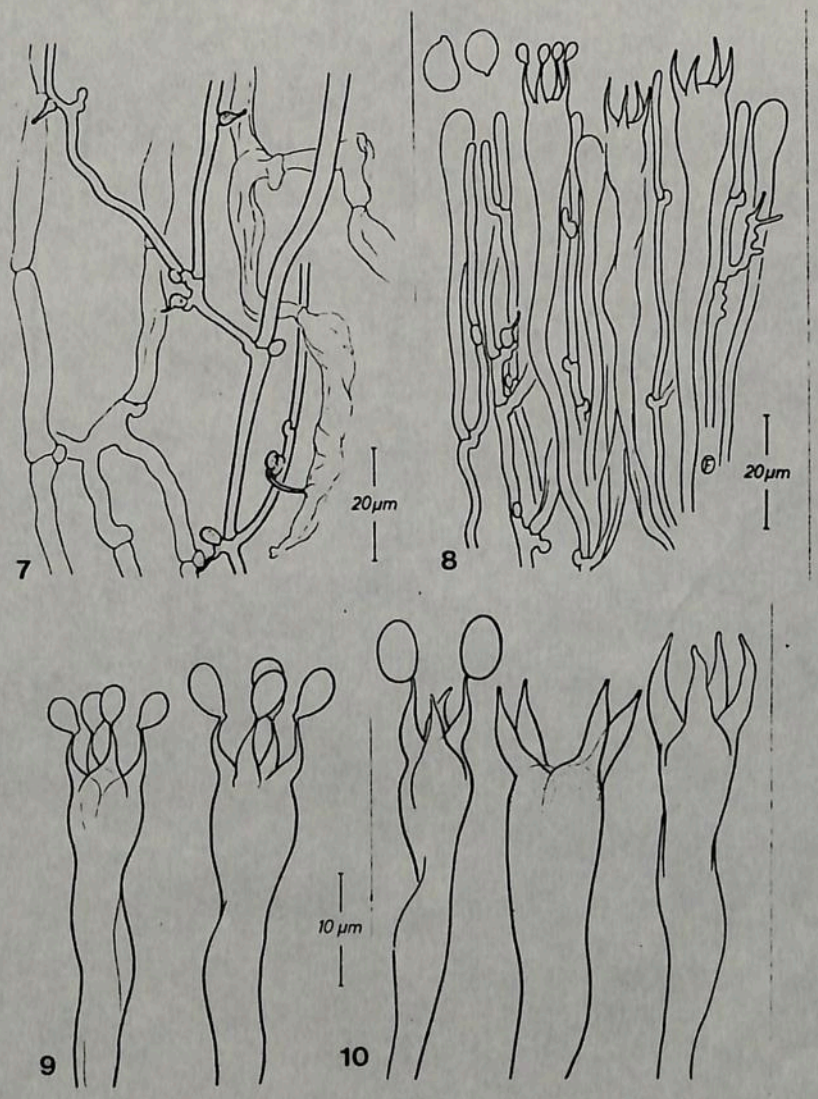


Fig.7: Hyphal context of the inner part of the basidiocarp; hyphae of the parasite connected to the host-cells with tremelloid haustoria. Fig.8: Part of the hymenium with different stages of basidial development and basidiospores. Fig.9: Apical parts of basidia with young basidiospores. Fig.10: Details of old basidia.

of the basidia are septate by clamp-connections. The basidiospores are hyaline, depressed and drop-like (fig.3), 6-8 x 9-11 µm, asymmetrically apiculate (fig.6), the walls thin, smooth, non-amyloid.

Those basidiospores which were germinating show predominantly a yeast-like budding of the Tremella-type (figs.4, 5). Rarely germination by hyphae could be also observed (fig.5). We do not know whether secondary spores can be formed or not.
In all known collections, conidial formation is very striking and apparently the only propagative stage in special developmental stages of the fruiting bodies. Short-celled conidiophores produce two terminal cells which simultanously begin to form opposed beak-like outgrowths (figs.11, 13, 14). These outgrowths extend to globose bodies which fuse to form a one-celled conidium that finally breaks off the conidiophore. The conidiogenous cells are capable of repeated conidium formation around the circumference of the transverse septum separating the cells.

In addition, the conidiophore-bearing hyphae proliferate strongly to produce successive conidiophores. An immense quantity of conidia results; these are spread over the outer and inner surfaces of the fruiting body.
In addition to the examination with the light microscope we also tried to study the fungus with the transmission electronmicroscope. Surprisingly the several years old herbarium material could be used to some extent for ultrastructural characterizations. There are two septal pore types present, both with dolipore structures. Many dolipores seem not to be covered by parenthesomes as in the septal pore structure of Filobasidium floriforme L. Olive (Moore & Kreger van Rij 1972) and Filobasidiella neoformans Kwon-Chung (Kwon-Chung & Popkins 1976). Because they are present in the hymenial region. We are convinced that these dolipores belong to the hyphae of Syzygospora alba. In basal portions of the basidiocarp, on the other hand, the second dolipore type with perforated parenthesomes can also be found. We are fully aware of the difficulties in interpreting ultrastructural details from dead, several-year-old material. However, some of the structures that are still visible are important and may be used for a better understanding of the taxonomic relationships.
The parasite is growing on hyphae which are thin-walled and clamped (fig.7); therefore the host must be a basidiomycete. Because of the lack of further characteristics a more detailed interpretation of the host cannot be given at the moment

PLATE III

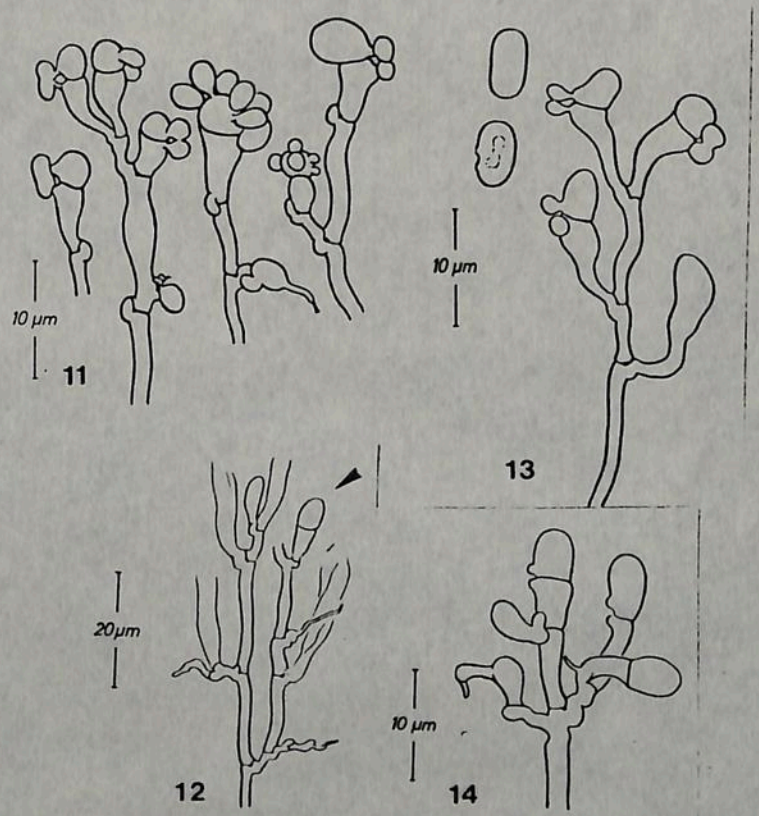


Fig.11: Conidiophores with different stages of zygoconidium formation. Fig.12: Conidiophore (arrow) showing connection with haustoria and collapsed basidia (from co-type of Syzygospora alba, Martin 2167). Fig.13: Conidiophores and conidia (Martin 2167). Fig.14: Young conidiophores connected with haustoria (Martin 2167).

To our knowledge, Syzygospora alba is presently known only from 6 collections from Panama and 1 collection from Mexico.

4. Discussion

The genus Syzygospora was erected by Martin in 1937 to describe the species Syzygospora alba. This fungus is characterized by the formation of paired blastogenous cells which fuse and are

released from the supporting hyphae (figs.11, 12). Martin (l.c.) interpreted this structure as a special type of auriculariaceous basidium. However, in a restudy of the species by Kao (1956), it was shown that the unusual structures were conidia and that the conidiophores were connected with generative hyphae that produce holobasidia. This can now be confirmed by our own investigations. Furthermore Kao elucidated nuclear behavior during conidium-formation: the primary outgrowths of the conidiogenous cells are uninucleate and, after the fusion, a dikaryotic conidium is formed. In a study of Christiansenia pallida Hauerslev, Boidin (1970) was able to demonstrate that the conidium-formation in this species is essentially similar. Because of the unique development, he proposed the term "zygoconidium" for the propagule.

After a detailed discussion, Boidin (l.c.) accepted the interpretation of Donk (1962) to consider the name Syzygospora as a "nomen anamorphosis". It seems obvious that Martin (1937) assigned the basidial-stage to the anamorph in his description. However, in the type-material the true teleomorph is also present. Fig. 1 a of Martin's illustration shows a young basidium and not a cystidium, as Boidin (1970) already correctly reinterpreted this figure. Our study of a co-type specimen (Martin 2167) confirms that collapsed basidia are connected with the conidiophore-bearing hyphae (fig.12). In another co-type (Martin 2517) Boidin (l.c.) found several basidiospores intermixed with innumerable conidia. Our study again shows that ana- and teleomorphs can be present in the same fruitingbody. Because of the same situation in the type-material we are therefore inclined to accept the interpretation of Art.59 of the Nomenclatural Code in the sense of Weresub & al. (1974), "... that the application of a name is determined by its type material". We consequently propose to use the name Syzygospora alba Martin for the teleomorph and the holomorph of this fungus. Therefore we also cannot accept the nomenclatorial transfer of the species to "Christiansenia alba Boidin ex Martin" (Boidin 1970).

On the other hand it seems justified to accept Christiansenia (Hauerslev 1969) as a separate genus mainly because of the very different fruiting body morphology. We are unable at the moment to assess the generic value of the different characteristics of the basidia and basidiospore germination types.

5. Acknowledgements

The late Dr.G.W.Martin provided co-type material used in this study. We are grateful to Dr.G.Guzman for sending the specimen of Syzygospora alba from Mexico.

6. Literature

Bandoni, R.J. 1961. The genus Naematelia. Am.Midl.Nat. 66, 319-328.

Boidin, J. 1970. Homobasidiomycètes résupinés et Héterobasidiomycètes saprophytes: XII.- Le genre Christiansenia Hauerslev 1969. Bull.Soc.Linn.Lyon 39, 132-137.

Donk, M.A. 1962. The generic names proposed for Hymenomycetes. XII, Deuteromycetes. Taxon. 13, 75-104.

Hauerslev, K. 1969. Christiansenia pallida gen. nov. A new parasitic Homobasidiomycete from Danmark. Friesia 9, 43-45.

Kao, C.J. 1956. The cytology of Syzygospora alba. Mycologia 48, 677-684.

Kwon-Chung, K.J. & T.J. Popkin. 1976. Ultrastructure of septal complex in Filobasidiella neoformans (Cryptococcus neoformans). J.Bacteriol. 126, 524-528.

Martin, G.W. 1937. A new type of heterobasidiomycete. Journ. Washington Acad.Sci. 27, 112-114.

Moore, R.T. & N.J.W. Kreger-van Rij. 1972. Ultrastructure of Filobasidium Olive. Can.J.Microbiol. 18, 1949-1951.

Spurr, A.R. 1969. A low-viscosity epoxid embedding medium for electron microscopy. J.Ultrastruct.Res. 26, 31-43.

Weresub, L.K., D. Malloch & K.A. Pirozynski. 1974. Response to Hawksworth & Sutton's proposals for Art. 59. Taxon 23, 569-578.

To be filled out by the office of origin.
A remplir par le bureau d'origine.

Registered article
Envoi recommandé

☐ Letter
Lettre

☐ Print
Imprimé

☐ Other
Autre

☐ Insured parcel
Colis avec valeur déclarée

Insured value
Valeur déclarée $ _____

Office of origin Bureau de dépôt
UNIVERSITY STATION
Baton Rouge, La. 70803

Date of posting Date de depot

No.
73783

Addressee (Name or firm) Nom ou raison sociale du destinataire

Street and No. Rue et No.

Place and country Lieu et Pays

To be completed at destination.
A compléter à destination.

This receipt must be signed by the addressee or by a person authorized to do so by virtue of the regulations of the country of destination, or, if those regulations so provide, by the employee of the office of destination, and returned by the first mail directly to the sender.

Cet avis doit etre signé par le destinataire ou par une personne y autorisée en vertu des reglements du pays de destination, ou, si ces reglements le comportent, par l'agent du bureau de destination, et renvoye par le premier courrier directement a l'expediteur.

Postmark of the office of destination
Timbre du bureau de destination

TUSCALOOSA 7
6-5 11-17
74

☐ The article mentioned above was duly delivered.
L'envoi mentionne ci-dessus a ete dumont livré.

Date

Signature of the addressee
Signature du destinataire

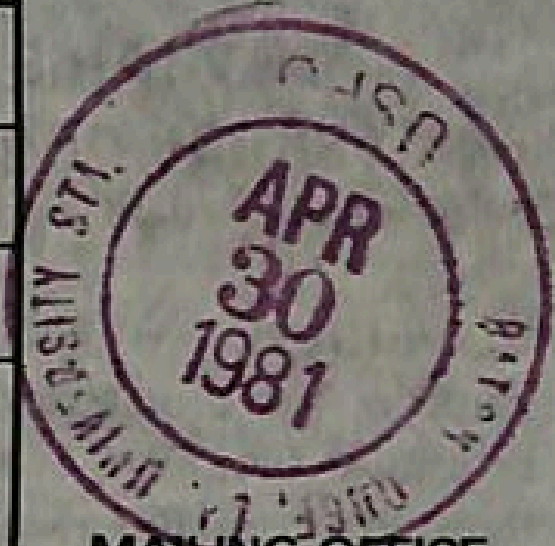
Signature of the employee of the office of destination. Signature de l'agent du bureau de destination.

REGISTERED NO. 73783

POSTMARK OF

POST OFFICE COMPLETION

Reg. Fee $ 3.30	Special Delivery $
Handling Charge $	Return Receipt $ .60
Postage $ 8.95	Restricted Delivery $
RECEIVED BY	AIRMAIL ☒



MAILING OFFICE

All Entries MUST be in Ball Point Pen or Typed

CUSTOMER COMPLETION (Please Print)

FULL VALUE $

FROM: Dr. B. Lowry
Botany LSU
Baton Rouge ZIP CODE La. 70803

TO: Dr. F. Oberwinkler
Universitat Tubinga
Tubinga W. Germany ZIP CODE

PS FORM 3806 Sept. 1979 **RECEIPT FOR REGISTERED MAIL** *(Customer Copy)*

Department of Botany
LOUISIANA STATE UNIVERSITY AND AGRICULTURAL AND MECHANICAL COLLEGE
BATON ROUGE · LOUISIANA · 70803
504/388-8485

30-IV-1981

Dr. F. Oberwinkler
Lehrstuhl Spezielle Botanik
und Botanischer Garten
Universität Tübingen
Auf der Morgenstelle 1
D 7400 Tübingen 1, West Germany

Dear Franz,

Many thanks for sending me the manuscript of your fine paper! It is a very significant, meticulous study with first rate illustrations, as in all of your work. I am flattered that you should consider inviting me to be a co-author. It is certainly most generous of you, in view of the fact that I have contributed nothing to all the work that you have put into it with so much care. The Heterobasidiomycetes are very close to my heart, but my position regarding their taxonomy (as I outlined in my 1968 paper in TAXON, and repeated in 1971 in FLORA NEOTROPICA) is perhaps not a very popular one! Nevertheless I remain convinced that my approach is a valid one. In any event, it would be an honor for me to be associated with you in this work.

At your suggestion, I have taken the liberty of making a few routine editorial changes for your consideration. Most of them are quite trivial, and none of them affect the main presentation or conclusions in any way. I have made these notations on a xerox copy of your original, so that you may accept or reject them as you see fit. Your comment on p.4 of the manuscript, pointing out that Syzygospora alba "sometimes partly cruciate-septate basidial apices can be found.....which appear Metabourdotia-like" I consider highly significant. Since Metabourdotia is such a curious genus, and one still not commonly known among mycologists, it may be helpful to cite Olive's paper in which it was first described (ie Olive, L.S. 1957. Tulasnellaceae of Tahiti. A revision of the family. in MYCOLOGIA 49: 663-679.)

I have kept another xerox copy of the manuscript with my notations, so that if you have any questions you may refer directly to the paper without having to send me another copy.

If you decide to submit the paper to MYCOLOGIA (Dr. T. Johnson, ed.) it could be retyped essentially as you have it in the original manuscript, only incorporating some of my suggestions. However, if you choose to send it to MYCOTAXON (Dr. R. Korf, ed.)(for more rapid publication) it must be retyped on special paper (I am enclosing some for you that I happen to have on hand) leaving appropriate, measured spaces in the text for insertion of the illustrations. It would be best to consult MYCOTAXON 1(1), 1974 for details.

With kindest regards,

as ever,

Mit herzlichen Grüssen

Dr. Bernard

UNIVERSITÄT TÜBINGEN
INSTITUT FÜR BIOLOGIE I
Lehrstuhl Spezielle Botanik
Prof. Dr. F. Oberwinkler

D 7400 Tübingen 1,
Auf der Morgenstelle 1
Telefon (07071) 292610

April 22, 1981

Prof. Dr. B. Lowy
Botany Department
Louisiana State University
B A T O N R O U G E L.A. 70803
U.S.A.

Dear Bernhard,

Enclosed you will find a manuscript on Syzygospora alba which deals mainly with the fungus sent by Dr. Guzman some years ago. During my studies it turned out, that the name Syzygospora has to be used for the teleomorph; in this case a new generic name for the basidial stage would be superfluous and stay in synonymy. It is also my opinion that this species does not belong into the genus Christiansenia as it was proposed by Dr. Boidin.

It would be a pleasure for me to publish this small paper together with you if you can accept the conclusions and the treatment of the subject. I would be very grateful for all suggestions of improving the paper. As you know it was not done quickly. It was rather difficult to find out what the fungus really is, and this because of lacking adequate descriptions and illustrations of the species.

I added a German summary in case of need of it. For example, in Mycotaxon a summary in a second language is often presented. What do you think for submitting the manuscript to this journal?

As I informed you some time ago, I am collaborating with Dr. Bandoni in several projects, one of which is the Christiansenia-group. Therefore I have sent the present manuscript also to him for information and criticism. He found that the present version might be acceptable.

Meanwhile I have done some TEM-work with both Phyllogloea singeri and Phyllogloea tremelloidea. I will inform you about this in another letter when TEM-pictures are available. Also I examined Neotremella guzmanii, but have not yet finished it.
I am very grateful to you for having sent this important material.

Best regards

Franz

P.S.

Enclosed are also the originals of the plates. Only xerocopies of them are inserted in the manuscript. The plates should be reproduced without changing of the size. If the line-drawings and the TEM-photo cannot be reproduced in one plate, this can be splitted into two so that in total 4 plates would result.

UNIVERSITÄT TÜBINGEN
LEHRSTUHL SPEZIELLE BOTANIK
UND BOTANISCHER GARTEN
Prof. Dr. F. Oberwinkler

D 7400 Tübingen 1 , March 14, 1978
Auf der Morgenstelle 1
Telefon (07071) 292610

Prof. Dr. Bernard Lowy
Louisiana State University
Baton Rouge, Louisiana, 70803
Department of Botany
U. S. A.

Dear Bernard,

I am very grateful to you for having sent to me the Guzman collection No. 11843. This is my opinion of the fungus in question : Basidium morphology, structure of the hymenium and texture of the fruitbody indicate a species of the genus Myxomycidium Massee. Checking the literature available for me gives no results on specific level. Unfortunately the only specimen I studied uptil the present one, which was a collection of M. pendulum made by E.J.H. Corner, was badly developped, or at least I was unable to find basidia and spores. So, my knowledge of the genus comes from literature.

With great pleasure I confirm your finding of spores which reproduce by conidia. I believe that this is an extremely important character, which is not as yet published. If the type of the genus, i.e. M. pendulum, forms conidia too, the generic identity seems to be correct.

Furthermore, I agree with your statement, that the fungus might be intermediate between homo- and heterobasidial taxa. R. Heim (Rev. mycol. 25 : 38 - 48 ; 1960), who apparently was not aware of the conidia (whether his species did have conidia or not, is unclear), came to the same conclusion. He placed his family "Myxomycidiacées, .. intermédiaire entre Protoclavariales et Aphyllophorales, marque une dérivation de celles-ci à partir des premières, des Holobasidiomycètes à partir des Calocéracées; "

So far as I can see, the "Myxomycidiaceae" are not correctly published. This should be done on the basis of the new findings. For this, a reexamination of the generic type is needed. But where good material is available ?

After a second examination, the collection is sent back to you.
I am also very grateful to you for the recommendation in support of Kenneth Wells' Humboldt Award.

With best wishes

Franz

(Prof. Dr. F. Oberwinkler)

24-II-78

Dr. Franz Oberwinkler
Institute für Biologie I
Universität Tübingen
Auf der Morgenstelle I
D-7400 Tübingen
Bundesrepublik Deutschland

No. 11843

Dear Franz:

The enclosed specimen is among the collections of tremellaceous fungi recently sent to me for identification by Gastón Guzmán of Mexico. It simulates a tremellaceous fungus in appearance but is holobasidiate. When soaked it is tough---gelatinous and multigyrose. I find long, 4-sterigmate basidia, the sterigmata being cornuate and measuring ± 6-8 µm in length. Some sterigmata are anomalous forming only 2 irregular sterigmata. The basidiospores are ovoid (± 8-10 X 6-8 µm) and they reproduce by forming conidia. Altogether, it is of considerable interest because of some characteristics that appear to be intermediate between homo and heterobasidial taxa. I hope you may have the time to examine it and to let me know your opinion of it.

Incidentally, just the other day, I wrote a strong letter of recommendation to Dr. Hellmut Hanle in support of your nomination of Kenneth Wells for a Humboldt Award. I hope that he is a successful candidate.

With best wishes,

Bernard Lowy
Professor of Botany

cas

Enclosure

See: Mycologia 73(6): 1108-1115. 1981.
Syzygospora alba Martin

LOUISIANA STATE UNIVERSITY
AND AGRICULTURAL AND MECHANICAL COLLEGE
BATON ROUGE · LOUISIANA · 70803
College of Arts and Sciences

DEPARTMENT OF BOTANY

21-III-1978

Dear Franz,

Thank you very much for your kindness in examining the Mexican collection which you identify as a Myxomycidium, something I have never seen. To clear up my ignorance of the genus somewhat, I referred to Linder's (1934) paper on "the genus Myxomycidium" in Mycologia 26: 332-343, in which he described 2 spp. nov., M. guianense and M. nodosum. Basidia are shown that seem to come within the range of the Mexican fungus, but have much smaller basidiospores, and there is no mention of conidia. G.W.Martin's sp. nov. from Colombia, M. flavum, in Mycologia 30: 435-438 (1938), is described as having ovoid spores (7-11 X 3.5-6 u), but again without conidial production. Martin also believed that his species showed "evidence of Heterobasidiomycete affinity." I was struck by the great differences between the basidiocarps described by Linder and Martin and that of the Mexican fungus. The relatively massive, tough gelatinous fruiting body of the Mexican collection, when compared with the small, "watery gelatinous" species of Linder and Martin, hardly seem cogeneric!

Why don't you consider publishing a revision of the "Myxomycidiaceae"? Linder mentions that the types of M. guianense and M. nodosum were deposited in the Farlow and M. pendulum should be at Kew. I don't think there is anyone who could do this more successfully than you.

With kindest regards,

Bernard
B. Lowy

PS – I have not seen Kobayasi's 1963 paper on Myxomycidium which is cited in Ainsworth & Bisby's Dictionary.

I am quite busy working on the neotropical Tremellales sent to me by Dumont, Guzmán and Lamundi (Tierra del Fuego), which will be included in a supplement to my 1971 paper in Flora Neotropica