

Discussions on Terminology

"When I use a word," Humpty Dumpty said, in a rather scornful tone, just what I choose it to mean - neither more nor less."

(Through the Looking Glass)

"Then you should say what you mean," the March Hare went on. "I don't," the Hatter hastily replied; "At least - at least, I mean what I say - that's the same thing as to know." "Not the same thing a bit!" said the Hatter.

(Alice's Adventures in Wonderland)

Here begins the most controversial segment of the book. New terms introduced, old terms retired, as we worked gradually towards a unified terminology during the last day and a half of the conference. In the Pre-conference, I suggested that, with the kind of conference set-up planned for Kanan, discussions could be "just as valuable ... as the papers." The present chapter bears this statement out. It is made up largely of discussion, and would epitomize the give-and-take of the conference. Prejudice and polemic abound. Ideas, too. And, finally, some recommendations, adopted either unanimously or by majority vote.

DR ELLIS

One of the main aims of this conference is to reach agreement about terminology which Fungi Imperfecti should be described. To ensure this, we have to clear our minds about the precise meaning of the terms we employ in our descriptions.

Descriptive writing lends itself to the use of long words; and in our effort to be precise or to avoid repetition, we tend to use a lot of nouns such as synanthropium, nidium and botryosporium. These are excellent within limits, but their use is increasing at an alarming rate. It may, perhaps, be more economical in the long run, and just as precise, to use quite a small number of clearly defined terms in conjunction with nouns already in common usage. Some of these nouns, even ones we use most often (such as conidiophore), need to be defined.

I believe that descriptions of Fungi Imperfecti should follow certain rules, and that they should be truly comparative. *Colony characters* may be followed by a description of *vegetative parts* - hyphae, setae, appressoria, stromata, sclerotium, next the type, arrangement, growth, shape, branching, swellings, colour

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walls of *conidiophores*; then the type, arrangement, proliferation, scars, denticles, and separating cells of *conidiogenous cells*; lastly, the origin, arrangement, type, shape, hilum, colour, septa, walls, and germination of *conidia*.

Many terms are already well defined in standard glossaries such as Snell and Dick's *A Glossary of Mycology*; some new ones appeared in a paper by Luttrell in *Mycologia*, 55 (1963): 643-74, and in Barron's *Genera of Hyphomycetes from Soil*, 1968. A few that I suggest we may discuss here, or which some of you may wish to see clarified, are: *conidiophore*, micronematous, macronematous; *conidiogenous cell*, phialidic, tretic, blastic, percurrent, sympodial; *conidium*, endogenous, exogenous, etc.

Dr Kendrick wrote on the blackboard "Think conidia." As chairman of this session on terminology, I'd like to second that recommendation. In our discussions I'd like us to avoid the word spore and substitute the word conidium whenever we are specifically mentioning a propagule produced by a Fungus Imperfectus. I'd also like to see us extend that preference to derivatives and compound forms: conidiogenous cell, phialoconidium, etc.

Now I'd like to read two definitions supplied by Dr Carmichael: (i) "The cell - any unit of a fungus thallus or spore which is morphologically separated from neighbouring units by a wall or septum." A footnote reads: "Contiguous cells do not necessarily contain individual protoplasts; cytoplasm and nuclei may pass from one cell to another." (ii) "The conidiogenous cell - any cell from which or within which conidia are directly produced."

Next is the conidiophore. We've had an excellent general account of this from Dr Pirozynski, but there was disagreement about a suitable definition, the main dissenter being Dr Carmichael. The original definition was "a hypha which bears conidia." We soon modified this to: "Conidiophore - a simple or branched hypha or hyphal system which forms conidia from either integrated or discrete conidiogenous cells." This enables us to use the term for both micronematous and macronematous conidiophores, whether the conidia are borne below, at, or above the surface of the substrate. Dr Carmichael's definition reads: "Conidiophore - a cell or cells differentiated to support the conidia away from the vegetative mycelium."

DR CARMICHAEL

The difference between these definitions is that the first includes both macronematous and micronematous forms, whereas the second says that micronematous forms do not have conidiophores as such.

DR S.J. HUGHES

Could the definition be expanded to include ascospores, the cells of which may sometimes bear conidiogenous cells? "A simple or branched hypha or hyphal system or spore ..."

DR CARMICHAEL

Yeasts have conidia but don't have conidiophores.

DR S.J. HUGHES

But they have a one-celled thallus which is itself a conidiogenous cell.

DR CARMICHAEL

Do you want to call this single conidiogenous cell a conidiophore?

Yes!

DR CARMICHAEL

A single conidiogenous cell *may* sometimes be a conidiophore. It may be dilated so as to hold the conidia well up away from the mycelium. The proliferating conidiogenous cell may form a conidiophore.

EDITOR

The meeting remains unconvinced. A straw vote rejects Dr Carmichael's suggestion.

DR S.J. HUGHES

There should be some indication in the definition that the conidiophore is another conidium or an ascospore. It also might be possible to introduce the term sessile where a conidiogenous cell is borne directly on the mycelium.

DR CARROLL

Does this category include situations where the conidiogenous cell is part of the mycelium?

DR HUGHES

The term integrated covers that case.

DR KENDRICK

Could I ask where we could fit in something about a single conidiogenous cell acting as a conidiophore? That should be explicit rather than implicit.

DR CARMICHAEL

If we have a branched system of prostrate hyphae, and conidia are formed at the tips of the branches, where is the conidiophore? We have terms for the elements - conidium, conidiogenous locus, conidiogenous cell, and hypha.

DR PIROZYNSKI

If prostrate hyphae bear isolated conidiogenous cells, these cells (for all intents and purposes) are conidiophores. If prostrate hyphae are made up of conidiogenous cells, the whole system constitutes a conidiophore. The distinction between a chain of conidiogenous cells and a prostrate one is most arbitrary.

DR CARMICHAEL

The whole thallus, then, is a conidiophore?

DR ELLIS

Only the parts bearing conidia.

DR CARMICHAEL

If the whole thallus, here and there, bears conidia, it would all be a conidiophore.

DR KENDRICK

My impression in the case Dr Ellis and Dr Carmichael are discussing is that the conidiophore is the conidiogenous cell. Otherwise you can't define it.

DR CRANE

In higher plants, a simple scale on a stem is recognized as a leaf - a modified reduced leaf. Here we have a simple cell - a reduced conidiophore.

DR ELLIS

We need as simple a definition as possible, to be in line with the original meaning of the word conidiophore, which is a hypha which bears conidia. We have extended this because a conidiophore can be a single cell, a spore, or a hyphal system; but basically it is something which bears conidia.

EDITOR

At this point there was considerable in-fighting: several people spoke at once, others were busy rearranging several definitions on the blackboard.

DR S.J. HUGHES

Traditionally, the term conidiophore has been applied to something that is different from the hypha that bears it, and I think there should be something in the definition to the effect that differentiated conidiophores may be absent. This would cover hyphae of the thallus which bear conidiogenous cells.

DR KENDRICK

It is still possible to interpret the whole of a hyphal system as a conidiophore - in other words, we can still disagree while using the same definition. It is not yet unequivocal.

DR SUBRAMANIAN

“A conidiophore is a simple or branched hypha, hyphal system, or spore which forms conidia from integrated or discrete conidiogenous cells. It may be reduced to a single sessile or integrated conidiogenous cell.”

DR HENNEBERT

I would replace “simple or branched” by “more or less differentiated.”

DR KENDRICK

This is probably the crux of Dr Carmichael’s argument. Even if the conidiogenous structure was growing along in the same direction as the vegetative hyphae on the surface of the substrate, if it was differentiated from those hyphae, it would be recognizable as a conidiophore. Here it may be reduced to a conidiogenous cell. We could say: “If there is no differentiated supporting structure, then the conidiophore is the conidiogenous cell.” Is that reasonable? It is a strange blend of the two positions.

DR ELLIS

That is O.K. A conidiophore, then, is a supporting structure.

DR KENDRICK

“A conidiophore is a supporting structure, be it a spore, a cell, a hypha, or a hyphal system, which is differentiated from normal vegetative mycelium, either morphologically or by the presence of a conidiogenous locus or loci.”

DR PIROZYNSKI

“A conidiophore is a system of conidiogenous cells, or a single conidiogenous cell, with or without differentiated supporting structures.”

EDITOR

The meeting, again with the exception of Dr Carmichael, provisionally accepts this definition.

DR CARMICHAEL

My reason for not accepting it is that, if we are going to say that all our fungi have conidiophores, then the term is superfluous. All fungi have conidiogenous cells of one kind or another, and if we do not wish to restrict the term conidiophore to some specialized structure that holds the conidia away from the vegetative thallus, we don’t need the term at all.

DR KENDRICK

All fungi have cells, so why do we need to define “cell”?

DR CARMICHAEL

We need to differentiate fungal cells from those of other organisms.

DR MÜLLER

There are fungi which don't have conidiophores - Phycomycetes, for example

DR CARMICHAEL

When I say "fungus," I mean "hyphomycete"! [Laughter]

DR ELLIS

I'd like us now to proceed to the report of the Arthroconidia Committee. I'd like to consider this first because the committee has made a very broad report with a number of important points. I'll call upon the chairman, Dr Kendrick, to read the report.

REPORT OF THE COMMITTEE ON ARTHROCONIDIA

Chairman: Dr Bryce Kendrick

Members: Dr Bill Carmichael, Dr Garry Cole, Dr Gregoire Hennebert, M. Pollack, Dr Keisuke Tubaki

We consider that the term arthrospore (now arthroconidium) as used in the temporary literature circumscribes a rather heterogeneous assemblage of conidial phenomena. Not only do arthroconidia, *sensu stricto*, differ ontogenetically from meristem arthroconidia, but the latter term encompasses two distinct groups. We decided that we could not treat these phenomena in isolation, but to examine and dissect the entire spectrum of conidiogenesis in an attempt to synthesize its basic components, and to synthesize a rational and inclusive term.

We recognized six components:

1. The kind of development shown by the individual conidium. We note a dichotomy between what Cole and Kendrick have described as "growth" and "conversion." The growth phenomenon we termed *blastic* and the conversion phenomenon we termed *thallic*. Our first definitions were: (a) *blastic* - marked enlargement of a recognizable conidium initial (more than 2 times linear); (b) *thallic* - little or no enlargement of a conidium initial (less than 2 times linear). [Conidium initial = a cell or part of a cell which will become a conidium by differentiation.] Further discussion of these terms, that our original conception had been too simple: while nicely defining the terms, we had ignored many forms in which "growth" and "conversion" were both involved. For instance, some conidia that we would clearly regard as *blastic*, those of *Amblyosporium*, and the intercalary chlamydospores of a number of fungi - expand to several times their original size before maturity. Our definitions of *blastic* and *thallic* overlapped in a most important respect. We eventually formulated the following more precise definitions: (a) *blastic* - marked enlargement of a recognizable conidium initial *before* the initial is delimited by a septum, (b) *thallic* - if any enlargement of the recognizable conidium initial occurs, only *after* the initial has been delimited by a septum, or septa.

In the discussion which followed, these definitions were reduced to the simplest terms:

- (a) *blastic* - conidium derived from part of a cell;
- (b) *thallic* - conidium derived from an entire cell.

2. The kind of connection between the conidium and the conidiogenous hypha:

	<i>Geotrichum candidum</i> Hughes's group VII	Conidial <i>Hysterium insidens</i> Group VA	Conidial <i>Monascus ruber</i> Group VB
Conidium ontogeny	Thallic	Thallic	Blastic
Connection	Full width	Full width	Full width
Conidia	Successive irregular	Successive regular	Successive regular
Conidiogenous locus	Irregular	Diffuse	Retrogressive
Conidiogenous cell	Determinate	± indeterminate	Determinate
	Shortening	± stable	Shortening
Secession by	Fission	Fission	Fission

- (a) *minimal* - narrow, comparable in width with a septal pore (perhaps obviating the development of a double septum);
 (b) *restricted* - wider than a septal pore, but noticeably narrower than the conidiogenous hypha;
 (c) *full width* - the full width of the conidiogenous hypha.

3. The way in which a plurality of conidia develop:

- (a) ± *synchronously*;
 (b) ± *successively* (in time), *regularly* (in space);
 (c) ± *successively* (in time), *irregularly* (in space).

4. The "conidiogenous locus" in 3 (b) and (c) may be:

- (a) *stationary*;
 (b) *retrogressive* (moving downward);
 (c) *progressive* (moving upward);
 (d) *irregular*;
 (e) *diffuse* or *extended*.

5. The modifications of a conidiogenous cell or hypha to permit production of a succession of conidia:

- (a) *stable* - no change in shape or size;
 (b) *shortening* - cell being consumed;
 (c) *growing* - (i) percurrently; (ii) sympodially, or by swelling; (iii) basauxically.

6. Methods of secession:

- (a) *fission* of inner wall, always at a double septum;
 (b) *fracture* of inner wall, not at a septum: (i) of an unmodified cell wall, (ii) of a wall with a thin area, (iii) of a wall weakened by lysis.

Having analysed "conidiogenesis" in the terms outlined above, we returned to a consideration of fungi producing the various kinds of "arthroconidia."

We recommend the rejection of the term arthrospore. If the recommended alternative arthroconidium (or, preferably, thalloconidium) is to be used, we would restrict it to conidia whose ontogeny is thallic, and whose connection is full width.

We recommend the rejection of the term meristem arthrospore for those conidia produced by *Monascus*, *Trichothecium*, and *Cladobotryum*, because these are essentially blastic conidia with full-width connection, which are produced by a linear, basipetal succession of conidiogenous loci which consume the conidiogenous cell.

The conidia of *Hysterium insidens* and *Phragmotrichum chailletii* clearly differ from those of *Monascus*, etc., in being thallic in origin and in involving a diffuse or extended meristem. We recommend the retention of the term meristem to refer to these conidia.

DR S.J. HUGHES

Have you numbered the concepts in the order of the importance you attribute to them?

DR KENDRICK

To some extent, but not altogether.

DR ELLIS

It is important to note all of these concepts, because they come into the discussion of the other sections. That is why I brought this report down first.

DR SUBRAMANIAN

Do these concepts in fact allow proper definition of such terms as blastospore, aleuriospore, as we have been using them?

DR ELLIS

It is a question of when the swelling takes place in relation to the laying down of the delimiting septum. Although conidia may look alike when mature, their ontogeny is the criterion here.

DR CARROLL

In view of the fact that septa are often pierced by septal pores, how valid is the criterion can the septum be?

DR KENDRICK

We know that in many fungi, for example, the *Basipetospora* state of *M. ruber*, the second conidium does not begin to form until the first conidium is delimited by a basal septum. Whether there is a septal pore or not, the actual laying down of the delimiting septum does seem to be a pivotal event.

DR ELLIS

May I proceed to some other recommendations of the Arthroconidia Committee? "We recommend the rejection of the term arthrospore. If the recommended alternative arthroconidium (or, preferably, thalloconidium) is to be used, we restrict it to conidia whose ontogeny is thallic, and whose connective is wide." "We recommend the rejection of the term arthrospore. If the recommended alternative arthroconidium (or, preferably, thalloconidium) is to be used, we restrict it to conidia whose ontogeny is thallic, and whose connective is wide."

Does the meeting wish to reject "arthrospore"? - Yes, unanimously.

Does the meeting wish to adopt one of the two substitutes proposed by the committee? - Yes, unanimously.

The committee has, I understand, a preference for "thalloconidium." Do the members of the committee like to give their reasons?

DR CARMICHAEL

The reason for preferring "thalloconidium" was that some of these conidia are produced considerably, whereas what we have become accustomed to calling arthroconidia generally do not. Some conidia which fall into this group may swell after they are laid down and become large and multicellular. Single, terminal conidia may be produced in this way. Neither of these match what we have been calling arthrospores. We preferred a more general term that covered all these cases.

DR KENDRICK

I agree with what Dr Carmichael has said. It all hinges on whether you like the "thallic-blastic" dichotomy. We tried for hours to think of an alternative and couldn't. Everything else we tried broke down.

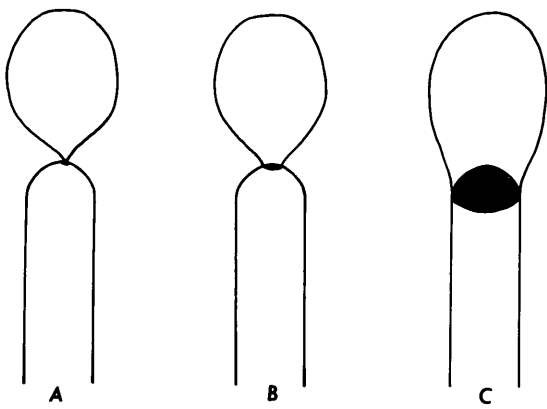


Figure 15.1

DR ELLIS

May we now vote on this issue? - 9 prefer "arthroconidium," 6 prefer "thalloconidium," and some members abstain.

The committee further recommends "rejection of the term meristem arthrospore for those conidia produced by *Monascus*, *Trichothecium*, and *Cladobotryum*, because these are essentially blastic conidia with full-width connection, which are produced by a linear, basipetal succession of conidiogenous loci which consume the conidiogenous cell."

Does the meeting wish to support this point of view? - Yes, unanimously.

We will have further discussion of the broader recommendations of the Arthroconidia Committee after we have heard the reports of the other committees. I would merely ask the meeting to decide now whether or not it approves of the "blastic-thallic" dichotomy, at least in principle. - Yes, all but two members approve.

Next comes the report of the Committee on Blastospores, Aleuriospores, and Chlamydospores (Chairman: Dr Bill Carmichael. Members: Dr Stan Hughes, Dr Gregoire Hennebert, Dr Gil Hughes, "and some visitors"). The keynote speaker, Dr Carmichael, early came into disagreement with the rest of the committee. [Laughter] The members wanted to proceed with a definition of the "blastoconidium," and to pay little attention to the aleuriospore and the chlamydospore. After five hours of discussion, I received from Dr Stan Hughes the following sentences - the quintessence. [Laughter] "A blastoconidium arises as a bud from a conidiogenous cell whose outer wall is continuous with that of the bud. Blastoconidia may arise solitarily, synchronously, or successively. Each blastoconidium may produce a chain of secondary conidia by acropetal budding."

EDITOR

Dr Ellis and several other members considered that the "blastoconidium" as here defined is only one of several kinds of conidia which fall under the major ontogenetic heading "blastic" as proposed and defined by the Arthroconidia Commit-

tee. Dr Kendrick pointed out that conidia with basically the same "blastogeny could be produced by the "blowing out" of a minute point on the conidiogenous cell, of a larger area of the apex, or of the entire apex of the cell (15.1). Dr Carmichael and others thought that "blastoconidia," rather than those defined in isolation, should now be placed in perspective, relative to other "blastic" conidia, by using the criteria outlined in the inclusive report of the Throconidia Committee.

The meeting decided to return to this discussion in the wider context of the general session on terminology, but to give qualified approval to an interim definition of "blastoconidium" as follows: "Blastoconidium - a conidium which is a blown-out portion of the conidiogenous cell. Blastoconidia may arise synchronously, or successively. Each blastoconidium may produce a simple or branched chain of secondary blastoconidia by acropetal budding."

REPORT OF THE COMMITTEE ON POROSPORES

Chairman: Dr Martin Ellis

Members: Dr George Carroll, Dr C.V. Subramanian

We note that the word pore and its derivatives are now used in widely different contexts (macroscopic, microscopic) within mycology. In deference to the established usage in descriptions of basidiocarp morphology in many Aphyllous Fungi Imperfecti like *Helminthosporium velutinum*. We recommend that the term *tretic* be accepted as an adjective suitable to define any conidiogenous cell which forms conidia solitarily or in acropetal chains through one or more minute channels in its outer wall. A conidiogenous cell with one channel may be described as *tretic*, one with several channels as *polytretic*. A *tretoconidium* is any conidium formed by a *tretic* conidiogenous cell.

Examples of hyphomycete genera with *tretic* conidiogenous cells: *Cutleriella*, *Dendryphiella*, *Dendryphiopsis*, *Drechslera*, *Exosporium*, *Spadicoides*, *Thosporium*.

DR ELLIS

"Treta" is a Greek word meaning "channel." The tiny opening through which *tretoconidia* emerge is a channel dissolved through the thick outer wall of the conidiogenous cell. *Tretoconidia* are clearly blastic. I am convinced that the use of "pore" and its derivatives to describe this phenomenon is unfortunate. To underscore the importance which I place on the need for a replacement, I may say that "tretic" is the first new term I have introduced in 25 years of mycological terminology.

DR PIROZYNSKI

I support the term *tretic* because it would be used with greater discrimination than many so-called porospores may not be *tretic*, as Dr Carroll's work on *Sterigmatocystis* shows. In addition, the word pore is also applied to another microscopic phenomenon - the germ "pore" - which is found on many spores and has no other significance.

EDITOR

A discussion of the usage, etymology, and semantics involved here was terminated by a vote, which accepted the committee's recommendations by 11 to 7.

REPORT OF THE COMMITTEE ON PHIALIDES

Chairman: Dr C.V. Subramanian

Members: Dr Bryce Kendrick, Dr Garry Cole, Dr Gregoire Hennebert, Mme Jacqueline Nicot, Dr T.R. Nag Raj

A "phialide" is a conidiogenous cell which produces, from a fixed conidiogenous locus, a basipetal succession of conidia whose walls arise de novo. The wall of the phialide is broken when the first conidium is extruded or liberated. The phialide wall from the point of rupture to the fixed conidiogenous locus is the "collarlette." The length of the phialide is not changed by the production of a succession of conidia, e.g. *Phialophora verrucosa* Medlar. The adjective phialidic derives from the term phialide.

Conidia produced from phialides (phialidic conidia) may be termed phialoconidia.

Phialides may proliferate vegetatively in a percurrent (e.g. *Catenularia*) or a sympodial (e.g. conidial *Lasiosphaeria hirsuta*) manner. A phialide with more than one open end formed successively (sympodially) or synchronously may be termed a polyphialide. A conidiophore which bears phialides may be termed a phialophore.

Although the nouns given above are acceptable, we recommend that an adjectival terminology be used wherever possible, since a description like "phialide proliferating sympodially" is more intelligible to the non-specialist and conveys more ontogenetic information than "polyphialide."

We consider the following terms unnecessary, and recommend their rejection: orthophialide (Gams), plagiophialide (Gams), schizophialide (Gams), pleurophialide (Gams), endoconidium (Brierley), ascoconidium (Seaver), endoconidiophore (Davidson), ascoconidiophore (Seaver).

We also recommend that "sterigma" should not be used for "phialide" (see Goos 1956, Proc. Iowa Acad. Sci. 63: 311-20), and that although "phialis" is the correct Latin singular, it should only be used in Latin diagnoses. The singular term originally proposed by Vuillemin (1910, C.R. Acad. Sci., Paris 150: 882-4), and ratified by more than half a century of usage, is "phialide."

DR S.J. HUGHES

The collarlette is one of the characteristic things about most phialides, and should be mentioned in the definition, but I'd like to amend the sentence: "The phialide wall from the point of rupture to the fixed conidiogenous locus is the 'collarlette.'" In some *Catenularia* and *Codinaea* species, some of the wall seems to disappear after rupture, and the collarlette that remains is much smaller than it was originally. I suggest, "The phialide wall distal to the fixed conidiogenous locus is the collarlette." Another important feature is that the first phialoconidium arises de novo, and its wall is free from that of the future collarlette - but perhaps it would be safer not to be too specific about the origin of the conidium wall, and say instead, "the first conidium arises within the apical extension of the phialide and is liberated by the rupture of the outer phialide wall."

DR KENDRICK

We must remember that the first phialoconidium sometimes carries away part of the outer wall of the phialide apex, giving a false impression that conidia are typically clad in that wall.

DR S.J. HUGHES

I'm trying to make the point that our definitions shouldn't be so cryptic & fail to characterize our terms properly. We aren't sending a telegram! [*La*

DR KENDRICK

We can give two definitions, one condensed and one expanded.

DR PIROZYNSKI

Phialide - a conidiogenous cell which produces from a fixed conidiogenous basipetal succession of conidia.

DR CARMICHAEL

Can any of those who want an expanded version suggest any kind of conidic cell, other than a phialide, which fits our short definition? I doubt it.

DR S.J. HUGHES

I don't like "fixed"; do we need to specify the conidiogenous locus so rigidly?

DR KENDRICK

In those phialides we have investigated so far, it is fixed from the beginning, becomes so. In the phialide of *Chalara*, the cross-walls (double septa) are laid at almost exactly the same place for all conidia after the first one or few. I confirmed this in our time-lapse film. I surmise that this is also the point at which the lateral walls of each conidium are laid down as the cytoplasm surges & but we haven't been able to verify that visually.

DR PIROZYNSKI

In *Wallemia ichthyophaga*, which in Barron's book does not have a placoderm system, a phialide-like conidiogenous cell produces a filament which breaks into arthroconidia. I would like to see the basauxic section broadened to include and other odd taxa (see discussion on basauxic conidiophores). One can, of course, argue that *Wallemia* has a phialide in which the delimitation of conidia is defined by this is the case, an arthroconidial phialide in which the protoplast is fragmented into conidia (showing little or no increase in size outside the conidiogenous cell) and a blastoconidial phialide (in which conidia are blown out to exceed considerably the diameter of the conidiogenous cell) may be examples of evolutionary convergence rather than divergence.

DR KENDRICK

Dr Pirozynski has argued persuasively for the segregation of what he calls "conidial phialides." However, in the conidial states of some *Ceratocystis* species - *Chalara*, *Chalaropsis*, *Thielaviopsis* (which Mr Nag Raj is grouping with *Chalara*) - often, before the apex of the phialide ruptures, a definite basipetal "doarthroconidial" segmentation occurs, which stops at a certain point at which the upwelling cytoplasm seems to strike a balance with the downward delimitation of conidia. So I'm not sure we can separate Dr Pirozynski's two types of phialide. The *Chalara* phialide appears to display both mechanisms.

DR SUBRAMANIAN

When arthroconidia form, I think the nuclei have already divided and been distributed along the hypha, since the hypha dissociates in an irregular way; but in the phialide the nucleus goes on dividing at one point.

DR KENDRICK

Yes, it's quite possible that we could finish up with a karyological definition of many of these mechanisms. [*But see Chapter 18.*]

DR ELLIS

Terms considered misleading or superfluous, and therefore proposed for rejection by the phialide committee: biphalide, sensu Swart (1959).

DR S.J. HUGHES

Are there two conidiogenous loci in this phialide which produce a double row of conidia? If so, wouldn't the term polyphialide cover it?

DR KENDRICK

Polyphialide is a strange term, because we are at present using it for only one specific kind of phialide, with more than one conidiogenous locus - the kind in which only one conidiogenous locus is functional at any given time, and in which vegetative proliferation is sympodial. Other phialides with more than one opening haven't been called polyphialides, and probably shouldn't be.

DR CARMICHAEL

I'm not really in favour of the term biphalide, but because we don't know enough about this phenomenon yet, we should reserve judgment. [*This was generally accepted.*]

DR ELLIS

The committee considers the term monophialide an unsuitable complement to polyphialide, because we already speak of monophialidic species in certain genera as those species in which the conidiophores bear, or consist of, only one phialide.

EDITOR

The conference supported the rejection of a number of other terms considered misleading or superfluous by the committee. Unanimous approval was given to both the short definition of phialide, and to the long definition as amended by Dr S.J. Hughes to read as follows: "Phialide - a conidiogenous cell which produces at least its first conidium initial within the apical extension of the cell; this is liberated by the rupture of the upper cell wall. Thereafter, from a fixed conidiogenous locus, a basipetal succession of conidia is produced. Any phialide wall distal to the conidiogenous locus is the collarette. The length of the phialide does not change during the production of a succession of conidia. Example, Phialophora verrucosa Medlar."

REPORT OF THE COMMITTEE ON ANNELLOPHORES

Chairman: Dr Stan Hughes

Members: Dr Martin Ellis, Dr Gil Hughes, Dr Garry Cole

An annellophore (or annellate conidiogenous cell) is typically a conidiogenous cell

producing a single terminal blastic conidium, and by percurrent vegetative proliferations (annellations), a succession of similar conidia, which may be annelloconidia or annellidic conidia. Examples: *Spilocaea pomi*, *Doratomyces stemonitis*, *Sporidesmium atrum*, *Triposporium elegans*, *Scopulariopsis caulis*.

EDITOR

There was some discussion of this, and several rearrangements were suggested.

DR ELLIS

Dr Carmichael has already suggested that we replace the term annellophore with annellide (to match phialide), for the specialized kind of conidiogenous cell we are now considering. It has also been suggested that if the term annellophore is retained, it should be applied to supporting structures which bear an annellophore (compare phialophore). The objections were: (i) the wide acceptance of the term annellophore in the literature, (ii) the similarity of "annellide" to a zoological term for a kind of worm.

EDITOR

The meeting put off final consideration of this until the general closing session.

DR SUBRAMANIAN

Annelloconidium is unsuitable and superfluous. We are not reducing the number of terms, though many of us had hoped to do so. Could we have a vote on that?

DR COLE

Tomorrow we'll have a similar vote on sympodioconidium. I hope people will want to keep that term. It doesn't really describe any definite entity, but it describes one thing in terms of another: the conidium in terms of the proliferation of the conidiogenous cell. Annelloconidium is a similar term.

DR KENDRICK

As the perpetrator of the term sympodioconidium, I would like to second the motion. Basic terms describing conidia should concern their individual or *not* the mode of proliferation of the conidiogenous cells. Both characters would, of course, be teamed in a description of an entire fungus. I would support both sympodioconidium and annelloconidium.

DR ELLIS

Perhaps we could include it in the description, but say that we do not recommend it. May we now vote on annelloconidium? - By a vote of 9 to 8, the conference recommends that the term annelloconidium should not be used.

EDITOR

Returning to the basic definition proposed by the committee, and the alternative put forward during discussion, the meeting unanimously agreed to accept the definition derived from two versions on the blackboard which differed in content rather than in form. The Conference did not perform the necessary vote subsequently, so it has fallen to the editorial prerogative. The editor alone, therefore, must accept blame for any inadequacies in the following definition: annellophore - a conidiogenous cell which produces a single blastic conidium.

apex of each of a succession of percurrent vegetative proliferations (annellations)."

The session adjourned at 10:30 p.m.

Dr Ellis opened Tuesday morning's session by stressing the developmental, as opposed to the descriptive, morphological, point of view, and went on:

DR ELLIS

I'd like to start this session with the report of the committee on sympodulae. This is one of the reports which will be most encouraging to the mycological public, because it actually recommends a *reduction* in the number of terms.

REPORT OF THE COMMITTEE ON SYMPODIALLY PROLIFERATING CONIDIOGENOUS CELLS

Chairman: Dr Garry Cole

Members: Dr Gregoire Hennebert, Dr Bryce Kendrick, Dr C.V. Subramanian, Dr Keisuke Tubaki

The adjective sympodial may be applied to any conidiophore or conidiogenous cell in which the growth of each of a succession of subterminal, lateral, vegetative apices ends in the production of a conidiogenous locus. The net effect is an increase in length or swelling of the conidiogenous cell. We must emphasize the description of the conidiophore or conidiogenous cell, because several very different kinds of conidia can be produced on sympodially proliferating conidiogenous cells: *Symptodiella acicola* produces arthroconidia; *Beauveria globulifera*, blastoconidia; *Curvularia inaequalis*, tretoconidia.

Thus we consider that the term sympodioconidia is misleading, and we recommend that it be rejected. We also consider the term sympodula to be more or less superfluous.

DR KENDRICK

Whenever possible, the basic descriptive terms applied to conidia should describe their actual individual ontogeny, not the characteristics of the conidiogenous cell from which they arise. As a rider, I would suggest that, since the terms polyphialide and sympodula are open to frequent misinterpretation and are also superfluous, they should be rejected.

DR CARMICHAEL

I'd agree with our definition of "sympodial," which conforms to the way the word has always been used. This adjective can apply either to a conidiogenous cell, or to a whole conidiophore. I agree that we need general descriptive terms like this. However, in the fungi we find three very distinctive kinds of conidiogenous cell. It would be useful to have terms for all three; I have suggested phialide, annellide, and rachide.

DR S.J. HUGHES

And the ampulla? It is also very distinctive.

DR CARMICHAEL

Perhaps so, but each of the other three kinds produces a succession of conidia. This is why I wanted annellide rather than annellophore, because the latter can apply to a whole conidiophore as well as to a conidiogenous cell. In *Stysanus*, *Scopulari-*

opsis, *Leptographium*, etc., there is a very definite conidiogenous cell which significantly from the annellophore of *Annellophora* - just as the rachides *tirachium* differ from the sympodially developed conidiophore in *Helmsporium*.

DR S.J. HUGHES

Most of us agree that the phialide and the annellophore (annellide) are distinct. But the term rachide is something different, being applied to a conidiogenous cell which may form conidia by several methods.

DR PIROZYNSKI

We should be consistent. If we are to use phialide, annellide, rachide, and annellophore, we should create nouns for conidiogenous cells which produce tetrads, chains of spores, catenate blastoconidia, or are transformed into arthroconidia or stem arthroconidia. Is this proliferation of terms necessary? Can't we, more precisely, describe the various types as annellated conidiogenous cell, sympodially conidiogenous cell, etc. - i.e. using an adjectival system? If people insist on nouns for everything, we should, to be consistent, coin more terms. If an annellophore is a conidiophore which bears or is composed of phialides, then an annellophore would be a conidiophore bearing or composed of annellides. What is going to call conidiophores which bear or are composed of other kinds of conidiogenous cell?

DR COLE

Dr Nelson has shown genetically that the ontogenetic stability of the phialide and the annellide is not shared by the sympodula, so I don't think we should have a special restrictive term for the sympodially proliferating conidiogenous cell.

DR SUBRAMANIAN

I suppose we have four types: blastic, thallic, phialidic, and tretic. I don't understand all cases of phialidic ontogeny yet, and we may still have to change our terminology. But if we can agree on these four types, we could find terms for the conidiogenous cells. We now have only one widely accepted name: the phialide. When first used by Vuillemin, it denoted only the shape of the conidiogenous cell and had no deep ontogenetic significance. We have restricted its application to ourselves. It is most improper to redefine terms like this, and we could easily dispense with the term phialide completely. We could use adjectives instead of nouns. Each of the four headings I have given above, we'll probably have several kinds of conidiogenous cell, depending on how it behaves or proliferates. For example, in the blastic type you can have percurrent proliferation and sympodially proliferation. These modes of proliferation can also be found in the tretic type. The annellide merely exhibits a form of percurrent proliferation. Sometimes tetrads can't be seen; so if we called these cells percurrent instead, little would be lost.

Another point concerning the annellide. In *Monospora setosa* and *Coniospora* we have a conidiophore with annellations separated by whole cells. Each cell with one or more annellations is an annellide according to the original definition. In *Coniospora* we have a conidiophore with several integrated annellides in it. It sounds like it doesn't fit. If the adjective annellate is used, one can say that the conidio-

several integrated annellated conidiogenous cells. I feel that adjectives are best. As many as are needed: sympodial, percurrent - sympodial sometimes, percurrent sometimes. Let us remember that the fungi vary so much that, if we try to find a noun for every variation, we'll be in trouble. Adjectives are more useful than nouns.

DR ELLIS

I fully agree with everything Dr Subramanian has said.

DR CARMICHAEL

I hope Dr Subramanian doesn't intend those terms to be mutually exclusive, because both phialidic and tretic conidia are blastically produced.

DR ELLIS

You can use two, three, or four adjectives to modify a single noun, but you can't modify nouns with nouns in the same way. You can say, "blastic-phialidic," "blastic-tretic." You could only do the same kind of thing with nouns if you used very long compound nouns of the kind found in German.

DR CARMICHAEL

The term annellide is a shorthand way of saying "annellated conidiogenous cell," and I, for one, do not wish to write out three words where one will do.

DR COLE

If you pin a name like rachide on a conidiogenous cell that begins by proliferating sympodially and then proliferates percurrently, you have a problem.

DR CARMICHAEL

Give me an example.

DR PIROZYNSKI

Eriomycopsis meliocola, which, together with related forms, Mr Deighton and I are going to put into a new genus, *Chionomyces*. The conidiogenous cell proliferates both sympodially and percurrently.

DR HENNEBERT

I think the various kinds of conidiogenous cell are organs which need names as well as adjectives. We should not abandon the terms phialide, sympodula, ampulla, annellide. Just as we say stroma or sclerotium, we need anatomical terms to designate these cells.

DR KENDRICK

We have one - conidiogenous cell. This is intelligible to the non-specialist, whereas many of our more arcane terms are not. They are the jargon with which we are accused of creating a smoke-screen, behind which to hide.

MRS POLLACK

I endorse the scheme we are constructing, but we need a hierarchy of terms. We have basic ontogenetic terms (blastic and thallic) and morphological terms (phialidic and tretic). They don't belong at the same level.

DR KENDRICK

I think what we need now is some kind of decision as to whether we would like to apply adjectives or nouns. That is the basic point at issue.

DR ELLIS

May we have a vote on this issue? Those who would prefer an adjectival system? - 14. Those who would prefer nouns? - 3. With the exceptions of Drs Hughes and

Hennebert and Mme Nicot, the meeting prefers the use of adjectives. This does not exclude the use of some nouns, but indicates a desire to curtail the proliferation of new nouns. In recent years this has been going on in our own field; and now with the application of electron microscopy, the possibilities are endless.

MME NICOT

I did not support either proposition. I am not in favour of a strictly adjectival system, nor of a proliferation of useless nouns!

DR ELLIS

May we record, then, that Mme Nicot is in favour of a combined system of adjectives and some useful nouns.

DR S.J. HUGHES

With recent advances in electron microscopy, we have seen many necessary terms proposed, but certainly not an "enormous proliferation"; new terms can be expected with such a new tool as the electron microscope. The *Fungi Imperfecti* are a vast group, nevertheless we do not have a great number of terms available at least in common usage, for referring to and for directing attention to distinct groups which the fungi themselves make.

DR ELLIS

Perhaps we are becoming a little more polarized over this than is necessary. Most of us feel that a simple adjectival system is basically a good idea, but that certain nouns are useful and expressive, and should be retained. Could we consider the usefulness or otherwise of the adjectives first, then consider the nouns? To me that we should certainly delete or not recommend such terms as *aleurio-spore* and *sympodioconidium*, and the terms proposed by Dr Gamble. We now consider the adjectives?

DR GOOS

It seems to me that Vuillemin's distinction of "thallospores" and "conidia" is a very valid one. There are two kinds of conidium development, thallic and blastic, and we could very nicely use this old dichotomy, including the arthroconidial thallic group, and all the others (six groups) in the blastic.

DR ELLIS

Could we have some views on the adjectives thallic and blastic?

DR CRANE

I think our emphasis on the septum is wrong. If we simply use "thallic" in the case of transformation or conversion, "blastic" as blown-out wall, we'd still have the fundamental types. We should disregard the septum because there may or may not be one there; or it may have a pore.

DR CARMICHAEL

Our definitions state whether the conidium initial is made recognizable at the formation of a cross-wall (thallic), or whether it is made recognizable at the formation of a conidium initial by morphological alteration of the shape of the conidium (blastic). In *Stemphylium*, as Dr Carroll showed us earlier, considerable morphological alteration occurs before a cross-wall is laid down, and the conidium initial is recognizable as such as soon as it begins to blow out, *not* when the cross-wall is formed. In *Geotrichum* or conidial *Hysterium insidens*, the conidium is clearly blastic.

such is delimited by the formation of a cross-wall, and after that it may grow (as in *Hysterium*), or it may not. It is clearly thallic. In the blastic form there is always growth after the conidium initial is morphologically delimited and before it is cut off by a septum.

EDITOR

The terms thallic and blastic are accepted unanimously.

DR G.C. HUGHES

I like the new scheme in many respects. The word that bothers me is "blastic." We seem to have a small-b "blastic" and a large-B "Blastic." A conidium can be Blastic and tretic; but can it be Blastic and blastic?

DR ELLIS

Is there any adjective that will more clearly define this? I used "blastic" previously in a restricted sense, but this concept has been enlarged and extended for me during this conference. I've seen and appreciated other people's points of view. It may be that we need an additional adjective or two.

DR SUBRAMANIAN

A line separates blastic and thallic. This is generally accepted by the meeting. But there are some objections to treating phialidic and tretic at the same level of significance. I think we are now applying blastic to cases where all the layers of the conidiogenous cell wall blow out. Thallic implies conversion rather than blowing out. Tretic implies that an inner wall layer blows out through the channel or pore. It is basically a blastic type, but only the inner wall blows out. The wall of the conidiogenous cell does not contribute to the average phialidic conidium; instead, a completely new wall is being laid down specifically for the conidium.

Where the total wall blows out, we could say that the process is "exoblastic"; where only an inner wall blows out, as in tretic and phialidic cases, the process could be called "endoblastic."

DR ELLIS

There is some agreement that we need to use the terms thallic and blastic, with phialidic and tretic as subdivisions of blastic.

DR CARMICHAEL

Dr Subramanian's point is well taken. It clarifies the difference between Blastic ontogeny and blastoconidium (as Dr S. J. Hughes has used the term). By blastoconidium we mean any exoblastic conidium - one where both inner and outer walls are involved. And perhaps "exoblastic" isn't the best term.

A VOICE, musingly

"Holoblastic"?

THE GROUP (one by one, and then in enthusiastic chorus)

"Holoblastic"! Yes!

DR ELLIS

"Holoblastic" would be very good indeed!

DR SUBRAMANIAN

Excellent term!

DR ELLIS

May I know who made that suggestion?

Dr Müller.

DR ELLIS

Thank you, Dr Müller, a very good term indeed.

DR KENDRICK

“Endoblastic” isn’t in that class.

DR SUBRAMANIAN

Would someone please suggest a substitute?

DR HENNEBERT

“Enteroblastic”?

DR ELLIS

Another good term. [*The group endorses it.*]

DR ELLIS

Perhaps now we can consider the interpretation of the term blastic, and of its subdivisions of this: holoblastic (suggested by Dr Müller) and enteroblastic (suggested by Dr Hennebert). To me these seem excellent suggestions. They are descriptive of what actually happens, and they eliminate the misinterpretation of the word blastic. What Dr Hughes, in 1953, called the blastoconidium is what we can now term holoblastic - the entire thickness of the conidiogenous cell involved in the “blowing out” of the conidia. The term enteroblastic means the “blowing out” takes place from inside and does not incorporate the outer layer(s) of the conidiogenous cell. This term covers both the blowing out within of a phialide (phialidic), and the blowing out through a narrow channel in the wall (tretic). This is a very clear and useful dichotomy. I think it necessitates the retention of the term phialide, because without the term we cannot have the adjective phialidic.

DR HENNEBERT

We must be quite clear that annellidic conidia are holoblastic, not enteroblastic. Each time the conidiogenous cell proliferates, it produces new outer wall and a new inner wall, and both of those layers are involved in the formation of a conidium.

DR S.J. HUGHES

In the long phialide of *Sporoschisma mirabile* and other similar fungi, the conidia are “carved out” of the cytoplasm. This process starts when the cell has already stopped growing, and is what I have always considered a sort of cleavage.

DR KENDRICK

I think our film sequence of *Chalara* shows that in cases like this a double scission is laid down between adjacent conidia. It doesn’t look like simple cleavage. I agree that it begins after the phialide has stopped growing, and this suggests that the first few conidia here are a kind of “endoarthroconidium.” Subsequent conidia may look like arthroconidia, but this is merely due to the tube-like structure of the collarette. They are actually formed at a fixed conidiogenous locus.

DR PIROZYNSKI

I wonder if “basauxic” really belongs in the holoblastic group? If we take the conidiophore mother cell as the conidiogenous cell, the filament that co

could be considered, as Dr Müller pointed out, equivalent to an atypical first conidium which goes on to produce different types of secondary conidia. In that case it would be enteroblastic, because it was the inner wall that elongated.

DR CARMICHAEL

The difficulties presented by the basauxic phenomenon arise because the so-called conidiophore mother cell sometimes produces a conidium first, then an additional conidiogenous cell or area which, in its turn, produces conidia. The filament is obviously enteroblastic, but it will form its own outer wall, and the subsequent conidia produced on it may be regarded as holoblastic.

DR ELLIS

I will now read out the short definition of a basauxic conidiophore, arrived at by Dr Tubaki and his committee, Mrs Pollack and Dr Pirozynski: "A basauxic conidiophore consists of a mother cell and an extending filament arising from it, which is conidiogenous."

DR HENNEBERT

I'd like to emphasize a point raised earlier: the similarity between the basauxic conidiophore and the phialide. I think they are both basauxic. I'd like to use the term basauxic for the combination of two kinds of growth.

DR KENDRICK

The term basauxic does not fit into our system of terms referring to the ontogeny of individual conidia. I think "basauxic" is a term comparable to "sympodial" in its level of significance.

DR CARMICHAEL

We must remember that our scheme of terms is *not* a classification of fungi. It is not even simply a classification of conidia. It is two separate and distinct things: (i) a classification of conidia on the basis of their individual ontogeny; (ii) a classification of various methods employed by the fungi to produce a succession or plurality of conidia. These two do not necessarily fall into any rigid relationship. The use of a term from (i) does not necessarily specify any particular term in (ii).

DR ELLIS

Perhaps we can now get the feelings of the Conference on our scheme: acceptance of thallic and blastic, the usefulness of holoblastic and enteroblastic, and the subdivision of enteroblastic into phialidic and tretic. All of these terms refer to individual conidium ontogeny. They do *not* refer to the shape or mode of proliferation of the conidiophore or conidiogenous cell, nor do they refer to the way in which a succession of conidia is produced. - Accepted unanimously.

DR SUBRAMANIAN

Since it is difficult to distinguish between blastospore in the sense in which it has been used, and gangliospore, because there are all intergradations between these two, I would now call them both holoblastic. I would also place conidia produced from sympodulae and annellides in this group. Then we are left with the tretic and phialidic conidia which both fall under the heading enteroblastic. Differences within each of these groups can be described in terms of the behaviour of the conidiogenous cell: basauxic, sympodial, percurrent, etc. The arthroconidia fall under the heading thallic. We can thus reduce the number of divisions and terms.

Since I shall not be with you this afternoon, but on my way back to En, would like to say with what pleasure I have attended this conference. What appealed to me most has been the give-and-take, the ready appreciation of member of other members' views. We have, as a result, been able to discuss and frankly every point that has been raised. I have been put onto the right many subjects, and I think we have all learned a good deal. We have appreciated new approaches presented to us, particularly by Drs Kendrick and Cole, Carroll and G. C. Hughes. We are entering a completely new stage in the study of the Hyphomycetes with these new and fascinating time-lapse sequences and electron micrographs. I have really enjoyed this conference. It is the best thing of this kind that I have ever attended. [*Prolonged applause*]

EDITOR

Pause for lunch, after which Dr Kendrick resumed the chair.

DR KENDRICK

We made considerable progress this morning in resolving some of our differences of opinion. Heslop-Harrison wrote that a natural classification is one based on the characteristics or tributes of an organism, or one expressing relatedness in the genetic or evolutionary sense. When we look at Fungi Imperfecti, we can't examine all attributes; we are only looking at parts of organisms. Nor can we consider relatedness in a genetic or evolutionary sense. Thus, if Heslop-Harrison is to be believed, we expect to achieve a natural classification of Fungi Imperfecti in the far future. We are trying here to establish an artificial system - I won't even call it a classification yet - which will incorporate as many as possible of the fungi with a minimum of overlap or confusion. Our new adjectival scheme is based on ontogenetically, taking its cue from Dr S.J. Hughes's original postulates. With other's help, we have perceived basic developmental similarities between and have devised some serendipitous terms to describe the ontogeny of in conidia. I hope we will continue to separate these from terms describing the ontogeny of conidiogenous cells that permit them to produce a succession of conidia. May we begin, this afternoon, by examining the case of what I call the "terminal thallic" conidium, in which the septum is laid down first and the conidium differentiates and grows. Is this really thallic? I think it is. A whole lot of people are involved; the basal septum is there before swelling begins. The idea of thallic development does not exclude growth subsequent to the laying down of the septum. In many cases, e.g. *Amblyosporium* and conidial *Hysterium insidens*, there is considerable growth after the septa are laid down.

DR HENNEBERT

Perhaps this solitary terminal thallic conidium and the solitary holoblastic "chlamydospores" of some members of Dr Hughes's group III are really transitional. Perhaps we should put these together as a transition between holoblastic and thallic.

DR KENDRICK

In the group III "chlamydospores," there is a differentiation of a recognizable conidium initial before the septum is laid down. By our definition, these conidia are holoblastic.

DR CRANE

We have stressed the concept of the septum quite well and quite fundamentally in the two definitions we've arrived at. Both definitions are based on the idea of a septum that either is or isn't being laid down, and not on the idea of a vegetative structure that is swelling.

DR KENDRICK

Another way of looking at it is to say that in blastic development, *part* of a cell is becoming a conidium, and in thallic development a *whole* cell is becoming a conidium.

DR G.C. HUGHES

The criterion that we used to distinguish these was the septum, the same thing upon which we based the very first definition we agreed upon, that of the cell.

DR HENNEBERT

I propose, then, that we adopt this principle of the septum, but on an experimental basis.

DR KENDRICK

It *is* experimental. Dr Hughes in 1953 said that *his* groupings were experimental. Only time will tell if our idea works. In 1971, at the first International Mycological Congress, we can meet again and reassess these characters.

DR SUBRAMANIAN

Perhaps a thallic conidium could be defined as "a conidium formed by the transformation of a pre-existing cell or cells."

DR CARMICHAEL

You have said, in different words, exactly the same thing that we said in our definition of thallic. Your definition may be a little less precise, but it is simpler.

DR S.J. HUGHES

I'd like to ask Dr Crane if there is any variation in the pattern of development exhibited by his aquatic fungi?

DR CRANE

No! There's always a septum laid down first to delimit the apical cell, which then develops into a conidium, either tetra- or sigmoid. We aquatic mycologists (Dr Tubaki and I) would like to call these "aleuroconidia."

DR CARMICHAEL

That is incompatible with Vuillemin's original definition of aleuriospore.

DR GOOS

Aleuriospore has been widely used in the literature. It was, and is, a confused term, and could only be rescued by a restrictive definition. It was originally coined for spores of some fungi which are pathogenic to humans, and has been used extensively in the literature of medical mycology for a very different kind of conidium.

DR CARMICHAEL

The term aleuriospore does not refer to whether a spore is thallic or blastic. It refers to the manner in which the spore secedes. Vuillemin described, in what he called *Aleurisma flavissimum* (which we now know as *Chrysosporium merdarium*), secession by lysis followed by fracture of the supporting or separating cell, or of the whole spore-bearing part of the mycelium. If you wish to use the term aleuriospore, it must refer to this method of dehiscence. If you don't want to consider dehis-

cence, but rather ontogeny, then you must use thallic or blastic, according to the spore develops. Aleuriospore is not a developmental term, either by origin or its subsequent usage in medical mycology.

DR CRANE

I will admit that the prefix "aleurio" was taken from medical mycology and has been wrongly used. My only argument is that there are perhaps 25 genera where a generic description begins with the word "Aleuriosporae." Regardless of what we decide here, we'll have to contend with that. There are only two aquatic registers here, and I don't know whether Ingold, Nilsson, and the others will be willing to drop the term aleuriospore. I thought perhaps the modification "aleuroconidium" would make some accommodation possible.

DR CARMICHAEL

There are an equal number of genera where aleuriospore is used in its original sense and where it is being changed. Should we change the original ones, or the new ones that were wrongly

DR KENDRICK

We've now heard both sides of this argument very well expounded, and I'm ready to vote - to make recommendations.

(i) Do we wish to retain the term aleuriospore in the sense in which it is used in aquatic mycology - 5 for; 10 against.

(ii) Should the term be retained in its original sense, as referring to the manner in which a conidium secedes, and as used in medical mycology? - 2 for; 13 against.

(iii) Do we wish to retain the term aleuriospore or aleuroconidium? - 3 for; 3 against.

Perhaps these aquatic genera, which have hitherto been called "aleurioconidia" could be fitted into our new terminology under some heading like "terminale conidia."

Let us now consider "chlamydospore" and "chlamydoconidium."

DR CARMICHAEL

I propose that chlamydoconidium be defined as a thallic or blastic conidium which is released by fracture or dissolution of a separating cell or cells. Examples: *Miella*, *Chrysosporium*, *Helicoma isiola*.

DR CRANE

I don't like the definition because it mixes blastic and thallic, two things which have been very clearly and decisively separated earlier.

DR GOOS

I believe this term should be reserved for thallic conidia whose function is survival. It should not be a term based on ontogeny or dehiscence, but on function.

DR KENDRICK

In other words, you don't think this term should have any part in our scheme?

MR BHATT

What will we call the chlamydospores of *Thielaviopsis basicola*? I can cite 25 references to these that have appeared during the past year.

DR KENDRICK

I consider them arthroconidia.

DR CARMICHAEL

I think they are chlamydospores in this sense, and later break up into conidia. They secede as a unit, and then break up.

DR KENDRICK

This is another case of a term which has been applied in several different senses. Are we to give it an ecological definition, a functional definition, or an ontogenetic definition, or are we to consign it to oblivion?

DR MÜLLER

We should remember that it is sometimes difficult to differentiate between a chlamydospore and a sclerotium.

DR KENDRICK

I would prefer to call them "thick-walled thallic" conidia.

DR G.C. HUGHES

That is a lot safer than trying to say something precise about something we don't know enough about.

DR S.J. HUGHES

There seems to me to be a complete series, from the intercalary chlamydospore, to the one which expands beyond the confines of the cell, to a shortly stalked one. Some may break off by fracture, some by lysis, but they form a group. I'd include *Humicola*, *Allescheriella*, *Trichocladium*, *Bactridium*, *Bactrodesmium*, some species of *Sporidesmium*, *Sepe-donium*, *Fusarium*, *Hypomyces*, and some others. I'd like to see chlamydospore retained for these. It could be defined as a terminal, shortly stalked, sessile or intercalary, blastic, thick-walled conidium.

DR CARMICHAEL

Most of the spores you have cited are thallic in the sense in which we defined that term.

DR HENNEBERT

One thing connecting all these spores is that they are developed from portions of undifferentiated vegetative hyphae.

MR BHATT

In the same fungus we may have intercalary chlamydospores which are thallic, and terminal chlamydospores which are blastic - e.g. *Humicola* and *Fusarium*.

DR KENDRICK

I don't know how you can be sure that the terminal chlamydospore is blastic if you haven't followed its development.

DR GOOS

In *Fusarium* I would say it is thallic.

DR HENNEBERT

Usually it is separate before the swelling begins. In *Mycogone*, too, and *Sepe-donium*, and *Chlamydomyces* - all are septate at the beginning. This is a good character.

DR CARMICHAEL

Do we want to include solitary, thick-walled, blastic conidia in the definition, or do we want to restrict it to those with thallic development? It is a matter of choice; the

248 term chlamydospore is not a part of our main scheme, so it doesn't really what we decide.

DR GOOS

I would like to move that we retain chlamydospore in its original sense, as by Barron: a thick-walled resting spore, frequently intercalary, which is for modification of pre-existing cells.

DR CARMICHAEL

Barron apparently restricted the term to cases of thallic development, and this would be a good idea.

DR PIROZYNSKI

Barron's definition covers all sorts of cells, which in some cases may not spores and have no taxonomic significance. They may be a way of disposing insoluble waste products; they may store food. Most fungi produce such abnormal environments - of which laboratory culture is one.

DR KENDRICK

A vote on the motion that we wish to retain the prefix "chlamydo-" with the "conidium." Those in favour? (8 in favour; 8 against.) That means we can't do that thing! Another vote: we wish to retain the term chlamydospore. (8 in favour.)

How about a definition of chlamydospore as follows: a thick-walled terminal, shortly stalked, sessile or intercalary spore?

DR CARMICHAEL

Most of the things that were previously called aleuriospores and chlamydospores are now included in this definition.

DR G.C. HUGHES

This is the one term we have dealt with that is used in all areas of mycology and other groups too.

DR KENDRICK

Could we consider section VB as erected by Cole and Kendrick in 1968? A section which comprises three fungi: the *Basipetospora* state of *Monascus ruber thecium roseum*, and *Cladobotryum variospermum*. The conidiogenous cells are usually consumed basipetally during the production of a series of blastic conidia. Cole has mentioned that the conidiogenous locus is retrogressive.

DR HENNEBERT

I propose the term retroconidia.

DR CARMICHAEL

These are typical holoblastic conidia; are we now going to give them a special name not because they are a different kind of conidium, but because they are produced on a different kind of conidiogenous cell?

DR KENDRICK

How about "retrograde blastic conidia," then?

DR CARMICHAEL

Fine. But *not* retroconidia.

DR SUBRAMANIAN

Retrogressive is better than retrograde.

DR KENDRICK

Would the Conference like to adopt the term retrogressive to describe the method by which a succession of the holoblastic conidia of the former section VB are formed? Unanimously adopted.

May we discuss the term annellidic?

DR SUBRAMANIAN

I suggest that percurrent is a good descriptive alternative.

DR HENNEBERT

Percurrent is too general; it applies to any kind of vegetative proliferation through the opening at the tip of the conidiogenous cell, like a phialide; or through the end of a broken-off hypha.

DR G.C. HUGHES

Should we not now consider whether annellophore is really the term we want?

DR KENDRICK

Does this mean we want to suggest an alternative noun, or that we want to use adjectives? First, may we discuss annellophore?

DR CARMICHAEL

Do we wish to distinguish between a percurrent conidiophore which does have annellations, and a specialized annellated conidiogenous cell as it occurs in *Stysanus* or *Scopulariopsis*? Do we wish to use annellophore for the conidiophore, and annellide for the conidiogenous cell?

DR KENDRICK

Or do we wish to use merely "annellated conidiophore" and "annellated conidiogenous cell"? First, I'd like to see the term annellation approved. Are we all in favour of its adoption? Yes.

Now the term annellate: does everyone approve of it? Yes.

The next question is, do we want to call this kind of conidiogenous cell an annellophore, or an annellide, or merely an annellated conidiogenous cell? Several people (Drs Carmichael, Pirozynski, Hennebert, Goos) have suggested that we should have counterparts for phialophore and phialide. My first question is: Does the Conference wish to accept the term annellated conidiogenous cell as an adequate description for the type now under consideration (percurrently proliferating - Hughes's group IIIB)? (5 for; 10 against.)

DR S.J. HUGHES

We are not rejecting the idea of adjectives here: we have already accepted annellate and conidiogenous cell, and can combine them whenever it is appropriate. We merely think a noun should also be available for occasions when *it* is appropriate.

DR KENDRICK

May we now vote to accept either annellide or annellophore as being equivalent to annellated conidiogenous cell? Those in favour of annellide? - 12. Those in favour of annellophore? - 0. Several people abstained because they prefer an entirely adjectival terminology, but almost half the members of the Conference still consider nouns like annelloconidium to be useful, not so much in the diagnoses, but in more general discussions and comparative accounts of species. They can save a lot of repetition.

DR PIROZYNSKI

I would like at this point to present a recommendation which Dr Tubaki, lack, and I have drawn up: "The Committee on Basauxic Conidiophores mends that this section be considered and classified independently of the scheme proposed, in view of the fact that it is the entire conidiophore complex is distinctive, rather than the type of conidium or conidiogenous cell."

EDITOR

The meeting gave its approval to this suggestion, neatly side-stepping perhaps the most problematical, but fortunately also the smallest, group under consideration. Despite the considerable discussion this group had received, the things still unknown about the basauxic phenomenon clearly made non-commitment the most prudent course.

DR KENDRICK

May we now consider a thallic group, Dr Hughes's section VII. One of those proposed for this kind of conidium ontogeny is "arthric"; another one we suggest is "disjunctive." I think we are fairly well agreed on what this section is about, at least in general terms, and we have definitions read into the proceedings.

DR HENNEBERT

Arthric is an appropriate adjective, and the conidia may be called arthric instead of arthrospores.

DR S.J. HUGHES

I'll go along with that.

DR KENDRICK

Does the Conference recommend the use of the terms arthric and arthroconidia? Almost unanimous; one abstention.

Now we have section VA, Dr Hughes's original section V: "meristem spores," he called them. The meeting is open to suggestions concerning this group.

DR COOKE

At the time this group was discussed, it was suggested that the word arthroconidia be dropped and that they be called "meristem conidia."

DR KENDRICK

That seems reasonable, because growth is going on over the whole series of conidia, and there seems to be persistent cytoplasmic connection.

DR CARMICHAEL

This is simply a thallic, basauxic conidiophore, and the conidia are arthric conidia.

DR HENNEBERT

They are certainly thallic. The conidium is initiated by the septation of a portion of the hypha. It differentiates with swelling and may become septate, and is finally released by the separation of the components of a double septum.

DR CARROLL

We've been considering conidium initiation to be a process different from conidium maturation. I wonder if, after the first septum is formed in the meristem, the rest of the observed growth could not be considered a form of maturation. In that case we'd have to consider the meristem as localized at the base.

DR KENDRICK

It's very difficult to localize it. Dr Hughes's original suggestion was that it was spread out, and I haven't yet met anyone who could point and say: "There's where the meristem is."

DR S.J. HUGHES

Dr Müller told me that there is a pore in the septum of the conidium in the chain of *Erysiphe*.

DR KENDRICK

There must be in all these cases, because the absolute amount of growth is very large in some cases (not so much in *Erysiphe*), and food must be continuously translocated up the chain to achieve this.

DR CARROLL

Then it really is a diffuse meristem.

DR KENDRICK

Yes, it's different from most other fungi whose meristematic zone is restricted to one conidium at a time, even in those which form chains of conidia.

DR S.J. HUGHES

It differs from arthric in retaining its meristematic connections. In a way, it's like a phialide without the outer wall.

DR KENDRICK

Can we, for the time being, put down "thallic meristem conidia," and then perhaps someone will come up with an appropriate word later? Do we all agree on that? - Yes, more or less unanimously.

All we have to do now is to deal with what the committee called blastoconidia, which would now be regarded as holoblastic. How are we to separate the various ways in which a succession of conidia is produced? "Retrogressively successive" is one. Annelidic is also distinctive because of the repeated percurrent proliferations. Holoblastic conidia are also formed on sympodial conidiogenous cells. They may be formed synchronously on swollen conidiogenous cells often known as ampullae, and they form in unbranched or branched acropetal chains.

It was now late. We had come to the end of our third session of the day, and the last of the Conference. Our energy, if not enthusiasm, was running out. We had tried to touch on all the subjects germane to our theme, and we had almost succeeded. But as we left the library for the last time we realized that an acceptable synthesis of our deliberations was still lacking. Determined to finish the job as far as was humanly possible, a group of nocturnal mycologists met in the lodge and doggedly proceeded to hammer out a scheme.

Proposals and counter-proposals followed in rapid succession. Pencils flashed as the air once again grew thick with smoke and controversy. The zealous proponents of a revolutionary system wrestled verbally with the scepticism of the more conservative element. It would not be true to say that all doubts were laid to rest that night, but at an advanced hour the group agreed upon a scheme. This scheme is provisional and experimental, and will doubtless evolve (or become extinct) as it

252 *faces the selection pressure of future mycological thought, observation, experimentation. It is presented in the next chapter, along with the other decisions and recommendations of the Conference.*
