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AN OPINION ON THE VALIDITY OF THE GENERIC NAME *POSTIA* FRIES 1874 (EUMYCOTA: APHYLLOPHORALES)

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In December 1995, Mr J.A. Simpson, State Forests of New South Wales, asked me for an opinion on the validity of publication of the generic name *Postia* Fries (1874). At his request, my reply to this enquiry is given here, with some additions and amendments.

The generic name *Postia* was first used by Fries (1874, p. 523) in a discussion of the genus *Polyporus*. Later in the same work (p. 586), under *Daedalea*, it was distinguished from other related polypore genera by several characters, and six species (indicated by number) were included in it. No type species was designated, no new combinations were made and the name *Postia* was not listed in the text in the numbered series of other genera treated in the *Hymenomycetes Europaei*. In recent years, the genus has been used by several authors (Jülich 1982; Larsen & Lombard 1986; Pegler & Saunders 1994; Redhead & Ginns 1985; Renvall 1992, amongst others) for taxa placed previously in the genus *Tyromyces* P. Karsten (1881, p. 17), but which cause a brown wood rot (in contrast to the type species of *Tyromyces*, *T. chioneus* (Fries) P. Karsten, which causes a white wood rot, see Redhead & Ginns 1985). An analysis of the literature by Redhead & Ginns (1985) led them to conclude '.... that the ability to produce a brown-rot is a highly significant taxonomic feature among the higher basidiomycetes'. Jülich (1982) considered *Postia* in detail, transferred 18 species to it, and gave a key distinguishing *Postia* from related genera.

Several other workers, however, adopt a different view about use of the name *Postia* for these brown rot taxa. Although Donk (1960) considered that *Postia* Fries was '.... validly published by Fries in accordance with the present Code', he accepted it only grudgingly and remarked that '.... there is much in favour that the fungus-name *Postia* Fr. be rejected in favour of *Tyromyces* P. Karst. at least until the taxonomy of that genus has been improved'. Later, he (Donk 1974) listed *Postia* Fr. as a synonym of *Tyromyces* P. Karst. Rejection of *Postia* has also been proposed by Gilbertson & Ryvarden (1987), Ryvarden (1991) and Ryvarden & Gilbertson (1994) for various reasons (see below) and Ryvarden & Gilbertson (1994) placed the brown rot taxa forming fleshy annual basidiomata and having a monomitic hyphal system with clamp connections in the genus *Oligoporus* Brefeld (1888).

The last three editions of the *Dictionary of the Fungi* are rather ambivalent in their treatment of *Postia* Fr. The sixth edition (Ainsworth, James & Hawksworth 1971) distinguished *Postia* Fries (1874) from *Postia* E.P. Boissier & E. Blanche (1875, Asteraceae) and commented that *Postia* Fr. is an earlier name for *Tyromyces*, giving Donk (1960, see above) as the authority. The seventh edition (Hawksworth, Sutton & Ainsworth 1983) changed tack and listed *Postia* Fr. as a facultative (heterotypic) synonym of *Tyromyces*, again giving Donk (1960, see above) as the authority. The recent eighth edition (Hawksworth, Kirk, Sutton & Pegler 1995) repeats the entry from the seventh edition, changing only the family given for *Tyromyces* from Polyporaceae to Coriolaceae.

In order to determine the status of *Postia* Fries (1874), the literature has been examined in the light of the provisions of the current nomenclatural code (International Code of Botanical Nomenlature, 1994 (ICBN)). The results of that examination are presented in this note.

A. The ICBN and the case of *Postia* Fr. 1874.
Conditions for effective and valid publication of fungal names are set out in Articles 29–45 inclusive of the ICBN. Those relevant to the case of *Postia* Fries are dealt with below.

1. *Effective publication*: *Postia* Fr. was published in the second edition of *Hymenomycetes Europaei* (1874), a major work on the basidiomycetes and its inclusion in this work ensured its effective publication, in accordance with Arts 29–31.

2. *Form of the name*: the name *Postia* has a form which complies with the requirements of the ICBN.

3. *Description*: *Postia* was first mentioned as a new genus on pp. 522–523 of Fries (1874), with reference to a fuller treatment later in the work (under *Daedalea*). On p. 586 (under *Daedalea*), it was described as a separate genus. Translations of the relevant paragraphs are given below:

pp. 522–523:

'In *Nov. Symb.* l.v., different Polypori, Polysticti and Trametes were dealt with. To these is added

the new genus *Postia*, which is discussed under *Daedalea*.'

p. 586:
'Excluding *Lenzites* and *Trametes*, *Daedalea* is a strictly defined genus, although definitely related to these. More distant are several Polypori with sinuous, labyrinthiform and intricate pores, which see nos 74–76, 84, 88, 110, *etc*. which differ from genuine *Polyporus* as *Daedalea* from *Trametes*. They are readily distinguished from *Daedalea* by flesh initially soft and moist, by delicate narrow pores, thin dissepiments and a trama showing no discolouration. These are established as a special ('peculiare') genus under the distinguishing name *Postia*.

4. *Reference to included species*: as can be seen from the above, several species formerly in *Polyporus* are referred to by number for inclusion in the new genus.

5. *Intention of the author*: there can be no doubt that Fries, in his original mention of *Postia* on pp. 522–523, intended to establish a new genus and that later in the same work, on p. 586, he distinguished it from related genera with a set of diagnostic characters and gave it the name *Postia*.

In Art.34 of the ICBN there are several conditions set out under which a name is not validly published. Their application to *Postia* Fr. is as follows:

1. *Non-acceptance by the author in the original publication*: Fries (1874) did not make any new combinations in *Postia*. However, from the evidence presented above, it is clear that he (a) described it (b) distinguished it from other related genera and (c) listed several species by numerical references for inclusion in it. Moreover, his use of the phrases 'novum genus *Postia*' and 'peculiare genus sub *Postiae* nomine' clearly shows that he fully intended to establish a new genus.

2. *Proposal as a provisional name*: it is clear that Fries did more than provisionally propose the genus; he took several steps showing that he firmly established the genus *Postia* and distinguished it from related taxa.

3. *Citation as a synonym*: *Postia* is not just listed as a synonym.

4. *Mere mention of subordinate taxa*: *Postia* is not published by mere mention of subordinate taxa. It is described, points of difference from other genera are mentioned and several species for inclusion in the new genus are listed.

B. Recent arguments against use of *Postia* Fries 1874.
As noted above, several workers reject *Postia* Fries for several reasons. Most of these are set out in the publications of Ryvarden and Gilbertson but these authors have several errors of fact in their accounts. These are:

(i) '.... Fries (1874) himself gave no indication that he intended to publish a new genus ...'(Ryvarden & Gilbertson 1994, p. 398). The translations given above of Fries' text show that is wrong; in fact, the reverse is the case, as shown by use of the phrases 'novum genus' and 'peculiare genus' referred to above.

(ii) Fries '... used the name only in the middle of two sentences ....' (Ryvarden & Gilbertson 1994, p. 398). In fact, Fries took one sentence on his pp. 522–523 to say that he intended to establish a new genus, and he took a whole paragraph on p. 586 to give its description, diagnostic characters and list of some included species.

(iii) Ryvarden (1991) lists the name '*Postia* Karsten 1881'. This is an error. There is no '*Postia* Karsten'; when Karsten (1881, p. 17) used the name, he listed it as '*Postia* Fr.' and included six species in it. Thus, there is no basis for the statement made by Ryvarden & Gilbertson (1994, p. 398) that 'When Karsten (1881) took up *Postia*, it was illegitimate because of *Postia* Boiss. & Blanch. (Saxifragaceae, 1875)'. The genus *Postia* E.P. Boissier & E. Blanche (which is Asteraceae, not Saxifragaceae) was published in 1875, one year later than *Postia* Fries (1874) and thus the Boissier & Blanche name is an illegitimate later homonym of Fries' name. Moreover, Mabberley (1987) indicates that the four western Asian taxa formerly included in *Postia* Boissier & Blanche are now placed in the genus *Rhanteriopsis* Rauschert, so no problems would be caused to botanists by use of *Postia* Fries.

(iv) Ryvarden & Gilbertson (1994) make much of the fact that the name *Postia* is not set typographically in the text like the other genera and seem to regard this as a lack of intention on Fries' part to publish a new genus. Why Fries treated *Postia* in this way is not known and present conjecture on the typography of the name will not solve this

problem. What is clear, however, from Fries' own words, is his intention to establish a new genus (pp. 522–523) and the carrying-out of that intention (p. 586) in a manner completely in accord with the provisions of the ICBN.

C. Typification

Donk (1960) selected *Polyporus lacteus* Fr.: Fr. as lectotype of *Postia* Fries (1874) from the several species listed (by number) by Fries. This was accepted by Jülich (1982) who also transferred 18 other taxa to this genus. *Polyporus lacteus* was transferred to *Postia* by Karsten (1881). It should be noted that Ryvarden & Gilbertson (1994, p. 435) cited *Polyporus lacteus* Fr.: Fr. (*Syst. mycol.* **1**: 359, 1821) as a synonym of *Oligoporus tephroleucus* (Fr.: Fr.) Gilb. & Ryvarden, based on *Polyporus tephroleucus* Fr.: Fr. (*Syst. mycol.* **1**: 360, 1821). As can be seen, *P. lacteus* is the earlier name and, if the names are treated as synonyms, it has priority. It is noted that they are treated as separate species by both Jülich (1982) and Pegler & Saunders (1994).

D. Discussion and conclusion

The present investigation was a purely nomenclatural one, to try and answer the question posed to me—in your opinion, was *Postia* Fr. validly published? My answer to this is an unequivocal yes and that the generic name *Postia* Fries 1874 fulfils all the provisions of the ICBN (1994) for both effective and valid publication. Fries was quite clear about his intention and, in the execution of this intention, did all that was required to validate his new genus. The absence of any new combinations and the difference in typography are not, in my opinion, sufficient to overturn the force of Fries' own words and actions, as given on pp. 522–523 and p. 586 of *Hymenomycetes Europaei* 1874.

The implications of this finding for the group of genera related to *Postia* have not been followed through. Both Jülich (1982) and Pegler & Saunders (1994) give keys distinguishing the several genera in this complex. Finally, nomenclaturalists being what they are, it would not surprise me if others disagreed with the views that I have expressed here!

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I thank Jack Simpson for raising the interesting question of *Postia* Fries 1874 with me and for providing copies of references. I am also grateful to the N.S.W. Department of Agriculture and to the Agricultural Scientific Collections Trust for access to the libraries of the Biological and Chemical Research Institute, Rydalmere and of Herb. DAR.

MEMBERSHIP OF THE INTERNATIONAL MYCOLOGICAL ASSOCIATION

The IMA has two categories of membership, namely sustaining societies and affiliated societies. Full membership of the Association costs $US 400 per year. Affiliated membership costs $US 60 per year. **Sustaining Societies** are: British Mycological Society, Deutsche Gesellschaft fur Mykologie, Korean Society of Mycology, Mycological Society of America, Mycological Society of Japan, Mycological Society of the Republic of China, Taiwan Agricultural Research Institute, and the Netherlands Mycological Society. **Affiliated societies** are: British Lichen Society, International Society for Mushroom Science, Mycological Society of Finland, Societa Veneziana de Micologie, South African Society for Plant Pathology, and Unione Micologico Italiana.

IMA promotes the study of fungi throughout the world most notably through the International Mycological Congresses. IMA also supports the development of mycology in developing nations by supplying 'seed' money for regional meetings. The IMA has developed several publications in co-operation with the International Myological Institute, primarily the Directory of Mycologists which lists mycological facilities throughout the world.

Information about the International Mycological Association is on the WWW. A notice has been posted on the MSA bulletin board at: http://lsb380.plbio.lsu.edu/ima/index.html

The Council has voted that the Australasian Mycological Society join IMA as an affiliated society. The cost works out at about $AUS1.00 per member per year.

THE GROWTH OF OUTPLANTED EUCALYPT SEEDLINGS AFTER NURSERY INOCULATION WITH ECTOMYCORRHIZAL FUNGUS

Report of a demonstration trial in western Sydney from 1994–1996

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It used to puzzle me that nursery inoculation of *Eucalyptus* species with ectomycorrhizal fungi was being vigorously investigated in Western Australia (*e.g.* Thomson *et al.* 1996) but in the eastern States, as far as I could tell, there was little activity in this field even though in the east there would be greater numbers of tree-propagating users (*e.g.* Greening Australia, Landcare, the Roads and Traffic Authority, various mine site rehabilitators, not to mention Green Olympics organisers in a hurry to revegetate Homebush Bay). In early 1994, I approached Michael Adams in the Sydney office of Greening Australia with a proposal to set up a public demonstration of the benefits of ectomycorrhizal inoculation as a first step in raising the profile of eucalypt seedling inoculation in New South Wales. As a result, we agreed to collaborate in conducting a low-budget demonstration trial; the School of Biological Science would contribute the fungal inoculum and mycological knowledge and Greening Australia the plant-raising expertise and facilities at its nursery near Blacktown and the outplanting sites in Horsely Park Corridor. This article reports on what was done and what happened.

Seedlings of three *Eucalyptus* species (*E. tereticornis*, forest red gum; *E. moluccana*, grey box; *E. eugenioides*, thin leaved stringy bark) were raised in Greening Australia's nursery in the Nurragingy Reserve at Doonside in western Sydney. At six weeks, when the seedlings were transferred from flats to tubes, they were inoculated with mycelia of *Pisolithus tinctorius* (Pers.) Coker & Couch. The isolate was No. 021 in Dr A.E. Ashford's collection of fungi at the University of New South Wales. As a precaution against the possible loss of mycorrhiza-forming ability during storage, the fungus was passed through one cycle of aseptic mycorrhiza formation in *E. tereticornis* in the laboratory about three weeks before it was to be used in the field trial. The mycelium inoculum consisted of 10 × 10 × 4 mm blocks cut from the margin of three week old cultures on modified Melin-Norkrans Medium (Marx 1969). About four hours before the inoculation on 9 March 1994, 120 agar blocks were cut out of the petri dish cultures and washed in five changes of 500 ml distilled quality water on a rotary shaker over a period of three hours to remove residual glucose. The blocks were then transported to the nursery at Doonside in a cooler.

When seedlings were transferred from the vermiculite germination medium to the peat and river sand growth medium in 60 × 160 mm tubes they were inoculated by placing a block of inoculum in contact with the roots of each seedling. Twenty seedlings of each eucalypt species were inoculated in this way. Another 20 seedlings of each species were transferred to tubes without receiving an inoculum and served as controls. All the seedlings were thereafter managed in the same manner as other tube stock in the nursery.

On 6 and 13 October 1994, the tube stock was planted out with the labour of LEAP scheme workers; 15 to 20-year-old youths employd under the Landcare and Environment Action Program. The out planting was done at two sites in the Horsely Park Corridor, a part of the Open Space Corridors scheme managed by the Deparment of Urban Affairs and Planning. Both sites were on a heavy clay soil over Wianamatta shale. Site 1 was a flat, grassy area with a soak at one end which included a part of the *E. tereticornis* block, mostly controls. Some *E. amplifolia* about 3 m in height were growing close to the other end of the trial, adjacent to the *E. eugenioides* block. These trees appeared to interfere with the trial: four plants amongst the nearby *E. eugenioides* controls grew noticeably faster than the others and a *Pisolithus*-like fruitbody was collected from an ant mound close by. Site 2 lay towards the bottom of a heavily grassed , untimbered, sloping paddock about 2 km east of Site 1.

The trial design was the same at each site. It consisted of three blocks in a line, each block containing 40 seedlings of one species of eucalypt, either *E. tereticornis*, *E. moluccana* or *E. eugenioides*, in that order. The 40 plants in each block were arranged in four rows of 10 plants, the rows, and the individual plants in the rows, were about 2 m apart. Two rows contained only uninoculated plants and the adjacent two rows contained only inoculated plants. This arrangement would make it easy to see any treatment effects. A statistically rigorous design in which the seedlings were randomised would have made recognition of such effects impossible and was therefore inappropriate to the aims of the trial. The sites were mown before planting but no fertiliser was applied. The young plants were watered only at planting and weeds were not controlled. Neither were the roots of control or inoculated seedlings inspected at any time to establish the presence, absence or extent of ectomycorrhizal infections.

Plant height was adopted as the principal measure for growth. However, at the Spring 1995 assessment stem diameter at 50 mm above soil level was recorded in addition to plant heights. As anticipated, the height and stem diameter values were closely correlated. Growth was measured in February and September 1995 and in February 1996. The accompanying table presents a selection of data that are useful as a basis for discussion: the mean height (cm) of the control plants of each species at each assessment and the effect of inoculation expressed as the percentage growth increment (or reduction) relative to the control value.

Inoculation trial summary

		Mean height of control plants (cm)				Inoculation effect (%)		
Site	**Species**	**Oct. 94**	**Feb. 95**	**Sept. 95**	**Feb. 96**	**Feb. 95**	**Sept. 95**	**Feb. 96**
1	*tereticornis*	20	24	27	42	26*	19	12
	moluccana	17	16	22	36	51*	53	50
	eugenioides	16	26	35	72	15	45	26
2	*tereticornis*	20	30	44	101	12	10	-4
	moluccana	17	19	27	59	35*	85	62
	eugenioides	16	25	49	99	35*	10	-1

* Significant at $p < 0.05$

The heights of the control plants show that, not surprisingly, the two site differ in relative fertility. By and large, the trees grew better on site 2 than on site 1. This was especialy true for the uninoculated *E. tereticornis* plants which at site 2 grew to more than twice their height at site 1. *Eucalyptus eugenioides* was the least sensitive of the three species to the different conditions at the two sites.

The table also shows the relative difference between the mean height of the control trees and the inoculated trees, expressed as a percentage of the control. The table shows that the first assessment (Feb. 95). about three months after planting out, the mean height of the inoculated trees of all species at one site or another was significantly greater ($p < 0.05$) than its control. At site 1, inoculated *E. tereticornis* and *E. moluccana* plants were significantly taller than their controls; at site 2 the inoculated plants of *E. moluccana* and *E. eugenioides* were significantly taller than their controls.

Eucalyptus moluccana registered a significant increase at both sites at the first asssessment and, over the next two measurement periods, the inoculated plants of this species showed large growth increments of 50 per cent and more. In contrast, the inoculated plants of the two other species tended to be outyielded by their controls with time after outplanting. In the case of *E. eugenioides* at site 1, the influence of resident ectomycorrhizal fungi from the nearby *E. amplifolia* trees on at least four of the control trees can not be discounted (the growth enhancement at the last assessment at site 1 becomes 62 per cent if the four outsize control plants are ignored).

The results of the trial provide a perhaps fortuitous but nonetheless convincing demonstration that nursery inoculation with an ectomycorrhizal fungus can benefit the growth of outplanted eucalypt seedlings. The success of the demonstration is especially gratifying considering the shoestring budget, the total lack of previous experience in the techniques of preparing and applying the inoculum, the fact that the strain of fungus was untested and that the seedlings were outplanted at the beginning of an extremely dry summer.

The trial was useful from an educational perspective in demonstrating the complexity of manipulating an ectomycorrhizal symbiosis. At Horsely Park, the growth response of the eucalypts to inoculation depended not only on the species of eucalypt but also on peculiarities of the sites and the length of time after outplanting. That the species and the source of the inoculant fungus are also critical variables is well known from the literature.

It may be argued that the outcome of the demonstration depended more on good luck than good science and because there was no statistical rigour in the trial design and no correlative data on mycorrhizal formation by inoculant and indigenous fungi the trial does not merit serious discussion. The element of luck (mainly in the selection of the strain of *Pisolithus*) can not be denied. But compared to other, similar field experiments, the results of the one reported here stand up well to comparison. For example, some workers in this field consider that a 50 per cent increase such as that seen in inoculated *E. moluccana* is large (Lapayrie *et al.* 1992). In Europe in the last 10 years, variation in the field response of forest trees to ectomycorrhizal inoculation has been very high (Le Tacon *et al.* 1992). from modest increases, to no effect and even growth reduction. In recent eucalypt outplanting experiments in Western Australia (Thomson *et al.* 1996) none out of 12 comparisons at one site and only three out of 12 at another gave statistically significant increases in growth. Albeit the increaes were large (70–100 per cent) but it is quite clear that the use of inoculant ectomycorrhizal fungi is still in an early stage of development.

It goes without saying that I am no longer puzzled why inoculating eucalypts with ectomycorrhizal fungi is not being systematically investigated in New South Wales. Obviously the task needs a sustained, well resourced effort of the sort led by CSIRO in Western Australia, the sort of effort that begs duplication in the small Australian pond. But with the inoculation technology still essentially in its infancy, is there anything that non-industrial tree planters in New South Wales can do?

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MACROFUNGI AND CLIMEX: A COMPUTER PROGRAM WITH APPLICATIONS FOR MODELLING SPECIES' DISTRIBUTIONS

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The use of the CLIMEX program for fungal distribution hypotheses is discussed.

Keywords: CLIMEX, computing, ecology, biogeography, modelling.

During recent investigations into the Australian Hygrophoraceae, use was made of the CLIMEX computer program, a software package developed by the Commonwealth Scientific and Industrial Research Organisation (Sutherst & Maywald 1985) which has now been released in Windows format by the Cooperative Research Centre for Tropical Pest Management at the University of Queensland. The enormous advantages of the program are that it provides a means of inferring biogeographical distributions of a species from minimal data sets and it operates on a desktop computer. CLIMEX had already been applied to more than 150 species of insects, invertebrates, vertebrates and plants and it was decided to use the program to predict the likely distributions of two species of *Hygrocybe.*

CLIMEX is used to model a species' distribution on the assumption that it is defined by climatic parameters. In nature, species' distributions may be affected by numerous factors such as host/predator relationships, disease, human impact, soil type, *etc.*, nevertheless it is true to say that if climatic conditions do not permit a species' reproductive survival, then it cannot occur at otherwise favourable locations. In this sense, the CLIMEX program predicts the possible geographical range of a species based on a suitable climate, but it cannot say if the species will definitely be present at a given location. On the other hand, locations which are **not** included in a CLIMEX hypothetical range will very likely be unsuitable for the species. When formulating a distribution hypothesis, the CLIMEX software does not use a simple climatic comparison; the program's algorithm can account for such variables as diapause, light intensity and greenhouse effects. It also assumes that there exists a season in the year when the organism under investigation will come under climatic stress (winter, drought, heat, *etc.*).

To develop a distribution hypothesis, the CLIMEX user requires two sets of data: climatic parameters for the species to be modelled and a meteorological database for the regions to be tested. The software package includes a world database of over 2,000 meteorological stations but additional meteorological data can be readily added. Species parameters can be derived by the user from an organism's known distribution, but the software does contain species templates for four climatic types: wet tropical, temperate, mediterranean and semi-arid. At least two methods can be

employed for parameter derivation by the user, but that selected for the investigation of the Hygrophoraceae was found to be both simple and effective.

The model assumes that each species has optimum ranges of temperature and soil moisture for reproduction and survival. Lower and upper values for the optimum range are selected based on the known distribution of the organism and, where possible, seasonal development. Selection is then made of a further two absolute lower and upper values beyond which the organism would be very unlikely to reproduce and survive. [For example, the Southern Beech (*Nothofagus cunninghamii*) is found in cool, very wet conditions of west coast Tasmania. Its optimum temperature range for development might be 8–15 Celsius, while the lower and upper absolute values might be 0 and 25 degrees Celsius respectively. Soil moisture settings might be 0.8, 1.5, 2.5 and 4, where a soil moisture value of 1 represents saturation and values above this represent run-off.]

An iterative procedure is then used to develop a set of species parameters. The first set of parameter values are essentially "reasonable guesses" and the program is then run to produce the inferred geographical distribution for comparison with the known distribution. If the CLIMEX prediction is incorrect (too small or covers areas where the species will definitely **not** be found, *etc.*) then the parameter values are modified until the inferred geographical distribution produced is a better fit. CLIMEX has stress parameters that are used to "fine tune" a distribution model until it reflects the known distribution. Once the parameters successfully model the known distribution, CLIMEX can then be used to predict where the species might occur outside its native distribution and becomes a powerful tool for pest management.

The two taxa selected for CLIMEX investigation were *Hygrocybe astatogala* (Heim) Heinemann and *Hygrocybe miniata* (Fr.: Fr.) Kummer. Both species occur naturally in a region that covers much of the eastern coast of Australia (including mountain regions of the Great Dividing Range), coastal Victoria and South Australia and parts of Tasmania but each species had different collection sites within this region (or occurrences at different times of the year) and climatic parameters were developed which reflected the individual distributions and/or occurrences. Table 1 shows the climatic values which were used to develop CLIMEX parameters for *H. astatogala* while Table 2 shows the initial and final values for the species parameters.

Table 1. Climatic values for *Hygrocybe astatogala* collection sites for the months during which collections were made.

Location	**Months**	**Av. Temp.(^{0}C)**		**Rainfall (mm)**	**Rel. Hum. (%)**
		Max.	**Min.**		
Sydney (NSW)	iv/v/vi	22.8	8.1	98–126	57–73
Katoomba (NSW)	v/vi	13	3.7	103–125	65–77
Adelaide (SA)	v	18.4	9.3	58	57–72
Binna Burra (QLD)	ii/iv	23.2	11.6	163–449	70–80
Mt Wellington (TAS)	v	11.3	4.1	64	69–73

Table 2. Species parameters for *Hygrocybe astatogala*, showing initial and final values.

Temperature (^{0}C)			**Moisture (0 = dry; 1 = saturated; >1 = runoff)**		
	Init.	Final		Init.	Final
DV0	8	4	SM0	0.4	0.6
DV1	16	10	SM1	0.7	0.8
DV2	27	25	SM2	1.5	1.6
DV3	32	30	SM3	2.5	2.5
Cold Stress			**Heat Stress**		
TTCS	5	6	TTHS	28	28
THCS	0.00001	0.001	THHS	0.001	0.003

Dry Stress			Wet Stress		
SMDS	0.5	0.4	SMWS	1.6	1.8
HDS	0.01	0.007	HWS	0.0001	0.005

Once initial species parameter values are set, the next step is to run the CLIMEX program and examine the distribution hypothesis. The parameters are then adjusted until the best fit for the actual distribution is obtained. Stress parameters have two values: the first is the threshold temperature or soil moisture level at which stress begins to accumulate; the second (a value between 0 and 1) is a rate parameter which determines the rate of accumulation of the stress to the organism: the larger the rate parameter, the greater the resulting stress. (A glossary of the parameters is given at the end of the paper.) Figure 1 shows the distribution hypothesis for the initial values set for *Hygrocybe astatogala* and Figure 2 shows the final result. The distributions are plotted for values of a CLIMEX variable called the "Ecoclimatic Index". This has a value from 0–100 and shows the likelihood of species survival at a particular location. An EI < 10 would indicate a low possibility of survival; 10–20 would indicate only moderate possibilities, but EI values greater than 20 indicate progressively greater chances of species survival at any location.

Figure 1. Hypothetical distribution for *Hygrocybe astatogala* based on initial values for CLIMEX parameters.

Figure 2. Hypothetical distribution for *Hygrocybe astatogala* based on final values of CLIMEX parameters.

To test the validity of the final species parameter values, the program was used to simulate a potential world distribution for the species. This successfully predicted that *Hygrocybe astatogala* should occur at the previously recorded site of Auckland (New Zealand) and also indicated locations within Madagascar (holotype locality). Figure 2 has therefore implications that *H. astatogala* will occur in Western Australia, but so far this has not been confirmed.

The final distribution map for *Hygrocybe miniata* is given in Figure 3 below. The generally warmer climates able to be exploited by this species are shown by a more tropical distribution, but again the south-west corner of Western Australia is depicted as a favourable location. It is very satisfying to report that at the time the original distribution was prepared (June 1995) the presence of *Hygrocybe miniata* in Western Australia was not known. Recent collections examined by the author (January 1996) have now confirmed *H. miniata* is present in the area suggested by CLIMEX and there is therefore a strong possibility that confirmation of the presence of *Hygrocybe astatogala* may only be a matter of time.

Figure 3. Hypothetical distribution for *Hygrocybe miniata* based on final values for CLIMEX parameters.

Only two fungal taxa have been examined using the program but the results are very encouraging. The main limitation of the program (apart from its necessary climatic assumption) is the size of the data base used for comparison purposes: CLIMEX may not locate suitable areas purely because its data base does not contain meteorological data for those locations. This has already been addressed for local work in Australia and the ability of the program to add more locations has proven very successful so there seems no reason why more use could not be made of CLIMEX to produce distribution predictions for other fungal species.

References

Sutherst, R.W. & Maywald, G.F. (1985). A computerised system for matching climates in ecology. *Agric. Ecosystems & Environ.* **13,** 281–299.

Acknowledgements

The author wishes to express his very deep thanks to Dr R. Sutherst and Mr B. Skarratt of the Cooperative Research Centre for Tropical Pest Management at the University of Queensland for their help in obtaining and using the software and to Dr. N. Bougher of the CSIRO in Perth, Western Australia for information on species of *Hygrocybe*.

CLIMEX Parameters

DV0-3: Temperature Index; DV0 = Limiting low temperature; DV1–DV2 = Optimal range; DV3= Limiting high temperature.

SM0–3: Soil Moisture Index; SM0 = Limiting low moisture; *etc.*

TTCS: Temperature Threshold Cold Stress; the temperature below which cold stress accumulates. THCS: Cold Stress temperature rate; rate parameter for cold stress values.

SMDS: Soil Moisture Dry Stress threshold; dry stress is accumulated if soil moisture levels drop below this value. HDS: Dry stress rate; rate parameter for dry stress values.

TTHS: Temperature Threshold Heat Stress; heat stress accumulates if temperatures rise above this value. THHS: Temperature rate Heat Stress; rate parameter for heat stress values.

SMWS: Soil Moisture Wet Stress; wet stress is accumulated if moisture levels go above this value. HWS: rate of Wet Stress; rate parameter for wet stress values.

The CLIMEX software package is available from The Software Applications Officer, CRC for Tropical Pest Management, Gehrmann Laboratories, University of Queensland, Brisbane, Qld, 4072. Cost: $295, plus $10 postage and packing. ph: 07 3365 1851; fax: 07 3365 1855. EMAIL: CLIMEX@ctpm.uq.edu.au

SUBMISSION TO THE COMMITTEE OF INQUIRY TO REVIEW AUSTRALIA'S QUARANTINE POLICIES AND PROGRAMS

Jack Simpson & Cheryl Grgurinovic
Australasian Mycological Society

On 13 June 1996 J. Simpson & C. Grgurinovic made a verbal presentation to the Quarantine Committee of

Review. The notes we provided to the Committeee follow below. It was our impression that the idea of fungi as weeds was novel to the Committee members. We also thought the Committee had not determined how to make economic assessments of the value of conservation of native flora and fauna or biodiversity in either the short or long term.

Submission to Public Hearing of the Australian Quarantine Review Committee in Sydney 13 June 1996.

We are in broad agreement with the recommendations of the Australian Academy of Science concerning exotic pathogens and invertebrate pests. However, we have concerns about introduction of fungi that are not known pathogens and their potential impacts on the Australian biota.

1. Timber imports.

Timber can be imported into Australia in a 'green' *i.e.* not dried condition. Sometimes the shipping documents state the timber has been treated with an 'anti-sapstain' but what that treatment was is rarely specified. On arrival in Australia the timber is inspected by AQIS and if insects are detected the timber is fumigated before clearance. However, regardless of the extent of fungus growth, or of sapstain or decay in the timber AQIS do not refuse entry. The occurrence of pitch canker fungus on species of *Pinus* and *Pseudotsuga* on the west coast of North America, a major source of imported timber, makes present quarantine practices a matter of great concern.

2. Bio-remediation agents.

There is much work being done on use of fungi to breakdown complex organic pollutants of soil. AQIS seems to be permitting entry of such fungi provided they are not known to be pathogens. Fortunately the State Environment Protection Agencies seem to have more responsible approaches and generally are insisting upon use of isolates of fungi from Australia.

3. Fungi for biological control of pathogens.

AQIS are allowing entry of diverse saprophytes for use as biological control agents *e.g.* species of *Trichoderma* for control of species of *Armillaria* and *Chondrostereum. Trichoderma* is a large and difficult genus with more than 120

recognised teleomorphs described overseas. The Australian flora is poorly known. The effect of exotic strains on the Australian mycoflora is not known.

4. Mycorrhizal fungi.
There is considerable interest in introducing mycorrhizal fungi reported to increase plant growth through improved nutrient uptake, or increased pest resistance, or because they produce edible and commercially desirable fruiting bodies. Already we are seeing ingress of these fungi into native communities *e.g. Amanita muscaria*, a symbiont of *Pinus* and *Betula* is now invading *Nothofagus* communities in Victoria and Tasmania. The exotic *Quercus* symbiont *Amanita phalloides* is invading *Eucalyptus* communities in the A.C.T. and Victoria (as it did previously in Africa). In the past two years two people have died in Australia from eating basidiomata of *A. phalloides*.

5. Edible fungi.
a. Imported fruiting bodies. There is the risk of introduction of exotic pathogens in needle or leaf fragments, bark, twigs *etc.* on basidiomata collected from the wild or cultivated on natural substrata. There is also a significant risk of introduction of mycophagous insects, mycophagous nematodes and mycoparasitic fungi. Most of these organisms are cryptic. The Australian fauna is poorly known. One has no confidence current AQIS practices will detect or prevent their entry.

b. Isolates for cultivation in Australia. AQIS have permitted introduction to Australia of numerous wood decaying fungi for cultivation for production of edible fruitbodies, *e.g. Agrocybe aegerita*, *Pholiota nameko*, *Hypzizygus* sp. and perhaps species of *Ganoderma*. Decay of wood in service is a major economic problem in Australia. It is possible some of these fungi will establish as significant decay fungi. In natural and in forest communities these fungi may establish with unknown impacts on the native fungal populations, or on the rates of breakdown of woody substrates. Concerns about Greenhouse gases, increased rates of breakdown of fixed carbon dioxide, and Australia's international obligations in this area seem to be ignored by AQIS.

6. Bio-economic risk analysis.
The promises of the Lindsay Committee have not been realised. Once an organism is established, and that is decided by AQIS, it becomes a State or Territory problem. Contingency planning is agricultural in focus. Aspects effecting native biota are largely ignored.

7. Ministerial responsibility for Plant Quarantine.
We would respectfully ask that the Review Committee consider if it is still appropriate for plant quarantine to be a Department of Primary Industries or Department of Trade responsibility. We think it may be more appropriate for plant quarantine to be a responsibility of the Department of the Environment.

Yours sincerely,

J.A. Simpson, President
C.A. Grgurinovic, Vice-President

Australasian Mycological Society

TAXONOMY IN CRISIS

On 18 October 1995 the ABRS Advisory Committee hosted a Workshop in Canberra (see 15 (1): 15–16). Copies of the report *Taxonomy in Crisis? A Report on a National Workshop in Canberra 18 October 1995* are available from The Director, ABRS, GPO Box 636, Canberra, ACT 2601.

INFORMATION ON TAXONOMIC RESEARCH IN MYCOLOGY IN AUSTRALIA

Kevin Hyde
The University of Hong Kong, Hong Kong

I will be presenting a paper at the Royal Botanic Gardens, Melbourne 1996 Commemorative Conference to be held at the University of Melbourne entitled 'Who will look after the orphans?'. As part of this presentation I would like to present an analysis of the present research being carried out in systematic and ecological mycology in Australia. If you are dirctly involved in such research or you are supervising students who do this research please can you send me information of the details. It is most important that I know of your research sothat I can present an overview of the research being carried out in Australia.

✂_____

Information required

Name of researcher:……

Supervisor (if applicable):……

Address:……

Title of Research:……

Brief outline of Research: ……

……

……

……

Funding (amount/body):……

Propose period for Research Project:……

Please send replies to Dr K.D. Hyde
Department of Ecology & Biodiversity
The University of Hong Kong
Pokfulam Road
Hong Kong

Email: kdhyde@hkucc.hku.hk

✂_____

ANNUAL GENERAL MEETING

Tom May
Australasian Mycological Society

The inaugural Annual General Meeting of the Australasian Mycological Society will be held during the Mycology Conference at the University of Melbourne on 1 October 1996. Members wishing to place items on the agenda should contact the Secretary by 19 September 1996.

Call for nominations

Nominations are requested for the following positions in the Australasian Mycological Society:
President, Vice-President, Secretary, Treasurer and two councillors.

Nominations should be submitted in writing, signed by two financial members of the Society and accompanied by the written consent of the candidate. Nominations should be received by the Secretary (Dr Tom May) by 31 July 1996. Objects and rules of the Society can be found in the Newsletter for March 1995, or can be obtained on request from the Secretary.

1996 COMMEMORATIVE CONFERENCE—MYCOLOGY CONFERENCE (MYCOLOGY BEFORE THE FLORAS)

There has been a good response with participants from most Australian states, New Zealand and Hong Kong, offering talks and posters on a range of microfungi and macrofungi, covering ecology, taxonomy, physiology and other topics. The deadline for abstracts was 31 May 1996, but late applications are acceptable, although there are only a few speaking spots remaining.

Registration forms and brochures for the Mycology Conference and the associated conferences on History (The Scientific Savant) and Botany (Beyond the Floras) are available from the Secretary.

Some financial assistance for students and unwaged members will be available at the discretion of the Council of the Society. Members seeking assistance should be presenting a paper at the Conference, and should send details of their status and a brief justification of the need for support to the Secretary by the 30 June 1996.

At the Beyond the Floras conference, which follows immediately, there will be a session on 'Orphan groups' (various non-vascular 'plant' groups). Professor David Hawksworth (International Mycological Institute) will talk in this session on 'Orphans in "botanical" diversity'.

MUSHROOM POISONINGS

J.A. Simpson

In April 1996 a 60 year old man died in Melbourne after eating basidiomata of *Amanita phalloides* (Vaill.: Fr.) Secr. (*Melbourne Age* 6 April 1996). This is the second human fatality in Australia as a consequence of eating *A. phalloides*; last year a man died in Canberra.

The *Sydney Morning Herald* of 20 June 1996 reported five people from a town in the Blue Mountains were taken to hospital after eating freshly picked mushrooms at a dinner party. I understand the mushrooms have been identified as *Omphalotus nidiformis* (Berk.) O.K. Miller [= *Pleurotus nidiformis*; = *P. lampas*].

CONFERENCES AND WORKSHOPS

4–9 August 1996	Berkeley, CA, USA	International Conference on Mycorrhizae	Dr Tom Bruns, 108 Hilgard Hall, Dept ESPM, University of California, Berkeley, CA, 94720-3110, USA Fax: 510-643-5098
5–8 August 1996	Dundee, Scotland	3rd Symposium of the International Working Group on Plant Viruses with Fungal Vectors	Dr Michael J. Adams, Plant Pathology Department, IACR-Rothamsted, Harpenden, Herts, AL5 2JQ, UK

17–24 August 1996	Education Centre, Budapest	Fifth International Congress of Systematic and Evolutionary Biology	IBUSZ, Congress Dept. RCS: 551-003-096 ICSEB V. Budapest Ferenciek tere 2. H-1053 Hungary
18–23 August 1996	Jerusalem, Israel	8th International Congress of Bacteriology and Applied Microbiology Division & 8th International Congress of Mycology Division	Secretariat IUMS Congresses PO Box 50006, Tel Aviv 61500, Israel
19–20 August 1996	Stillwater, Oklahoma, USA	The First Fungal Genome Workshop	Darlene Brooks, Coordinator, Extension Programs, Arts & Sciences Extension, Oklahoma State University, Stillwater, Oklahoma 74078 USA Fax: 405 744 6992 Email: dbrooks@okway.okstate.edu
20–24 August 1996	Cambridge, UK	2nd International Symposium and World Congress on the Preservation and Conservation of Natural Science Collections	The Administrator-World Congress, Department of Earth Sciences, University of Cambridge, Downing Street, Cambridge, CB2 3EQ, UK
25–29 August 1996	Konstanz, Germany	6th International Fungal Spore Conference	Kurt Mendgen, Phytopathologie, Universitat Konstanz, Postfach 5560, D-78464 Konstanz, Germany
25–29 August 1996	Veldhoven, the Netherlands	8th International Congress for Culture Collections (ICCC-8): Culture collections to improve the quality of life	Secretariat ICCC-8 Centraalbureau voor Schimmelcultures PO Box 273, 3740 AG Baarn, The Netherlands
25–30 August 1996	Sydney, NSW, Australia	9th International Symposium on Yeasts	9th ISY Secretariat, GPO Box 128, Sydney, NSW 2001 Australia. Ph.: 61 2 262 2277 Fax: 61 2 262 2323
1–7 September 1996	Salzburg, Austria	3rd International Association for Lichenology Symposium: Progress and problems in lichenology in the nineties	Dr Roman Turk, University of Salzburg, Institute of Plant Physiology, Hellbrunnerstr. 34, A-5020 Salzburg, Austria. Ph.: +43 662 8044 5588 Fax: +43 662 8044 5010 Email: tuerk@edvz.sbg.ac.at
30 September–1 October 1996	Melbourne, Vic.	The 1996 Commemorative Conference, The Scientific Savant in Nineteenth Century Australia	Dr T.J. Entwisle 1996 Commemorative Conference Committee Royal Botanic Gardens Birdwood Avenue South Yarra, Vic. 3141 Australia

2 October 1996 (See notice below)	Melbourne, Vic.	Mycology before the Floras & 1st Australasian Mycological Conference	Dr T.J. Entwisle 1996 Commemorative Conference Committee Royal Botanic Gardens Birdwood Avenue South Yarra, Vic. 3141 Australia
3–5 October 1996	Royal Botanic Gardens, Melbourne, Vic.	The 1996 Commemorative Conference, Beyond the Floras	Dr T.J. Entwisle 1996 Commemorative Conference Committee Royal Botanic Gardens Birdwood Avenue South Yarra, Vic. 3141 Australia
21–25 October 1996	IMI, Egham, UK	Mycotoxins—occurrence, significance and analysis	Stephanie Groundwater, International Mycological Institute, Bakeham Lane, Egham, Surrey, TW20 9TY, UK Ph.: 01784 470111 Fax: 01784 470909 Email: s.groundwater@cabi.org (please give your postal address)
29–31 October 1996	Beltsville, MD, USA	The first International *Fusarium* Biocontrol Workshop	Robert D. Lumsden, Research Leader, Biocontrol of Plant Diseases Laboratory, Plant Sciences Institute, Bldg 011A, Room 275, BARC-West, 10300 Baltimore Avenue, Beltsville, MD 20705, USA
18–22 November 1996	IMI, Egham, UK	Isolation and Identification of Fungi from Natural Habitats	Stephanie Groundwater, International Mycological Institute, Bakeham Lane, Egham, Surrey, TW20 9TY, UK Ph.: 01784 470111 Fax: 01784 470909 Email: s.groundwater@cabi.org (please give your postal address)
18–23 March 1997	Asilomar, CA, USA	The 18th Fungal Genetics Meeting	Dr N. Louise Glass, Biotechnology Laboratory, University of British Columbia, Vancouver, BC V6T 1W5, Canada Fax: 604 822 6097 Email: glass@unixg.ubc.ca
1998	IMI, Egham, UK	*Fusarium* workshop	Kathy Gott Department of Crop Sciences University of Sydney NSW 2006 Australia
9–16 August 1998	Edinburgh, Scotland	7th International Congress of Plant Pathology	ICPP98 Congress Secretariat, c/o Meeting Makers 50 George Street, Glasgow G1 1QE, Scotland, UK

23–28 August 1998	Jerusalem, Israel	6th International Mycological Congress	Secretariat 6th International Mycological Congress PO Box 50006, Tel Aviv 61500, Israel

If you know of any other conferences, symposia, workshops, *etc.* that may be of interest to members, please send us the details so the information can be included in the next *Newsletter*.

C. Grgurinovic

NEW BOOKS

Grgurinovic, C.A. *Larger Fungi of South Australia.* Flora and Fauna Handbooks Committee of South Australia.

Publication is being held up by State Print which is unable to find the necessary funds to print the book.

MYCOSURFING ON THE WORLD WIDE WEB

The American Mycological Society now has a home page.
<http://www.erin.utoronto.ca/soc/msa/>

NEW MEMBERS

Full member:
Dr David Nehl, Narrabri, NSW

CALL FOR CONTRIBUTIONS TO THE *NEWSLETTER*

The editors would like to thank all those who contributed to this issue of the *Newsletter*. We would greatly appreciate continued support and would particularly like to receive contributions from members who have not previously written articles for the *Newsletter*.

C. Grgurinovic & J. Simpson

DEADLINE FOR NEXT ISSUE

Articles for the next *Newsletter* are due by Friday 6 September 1996. If articles are more than half a page long, the editors would appreciate a copy on disc. The disc will be returned after publication of the *Newsletter*.

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