



# OF ANTS AND CICADAS

Thinking and Doing

# THIS EVENING'S BRIEF

“We’d like you to use this as an occasion to ...

- make your research interests more widely known, as well as to
- talk a little about your methods and approaches to
  - research,
  - publishing and
  - postgraduate supervision,

so that others might benefit from your model of success. The lecture should be pitched at a broad audience.”

TELL US, IN LAYMAN'S  
TERMS, WHAT YOUR  
BREAKTHROUGH MEANS.

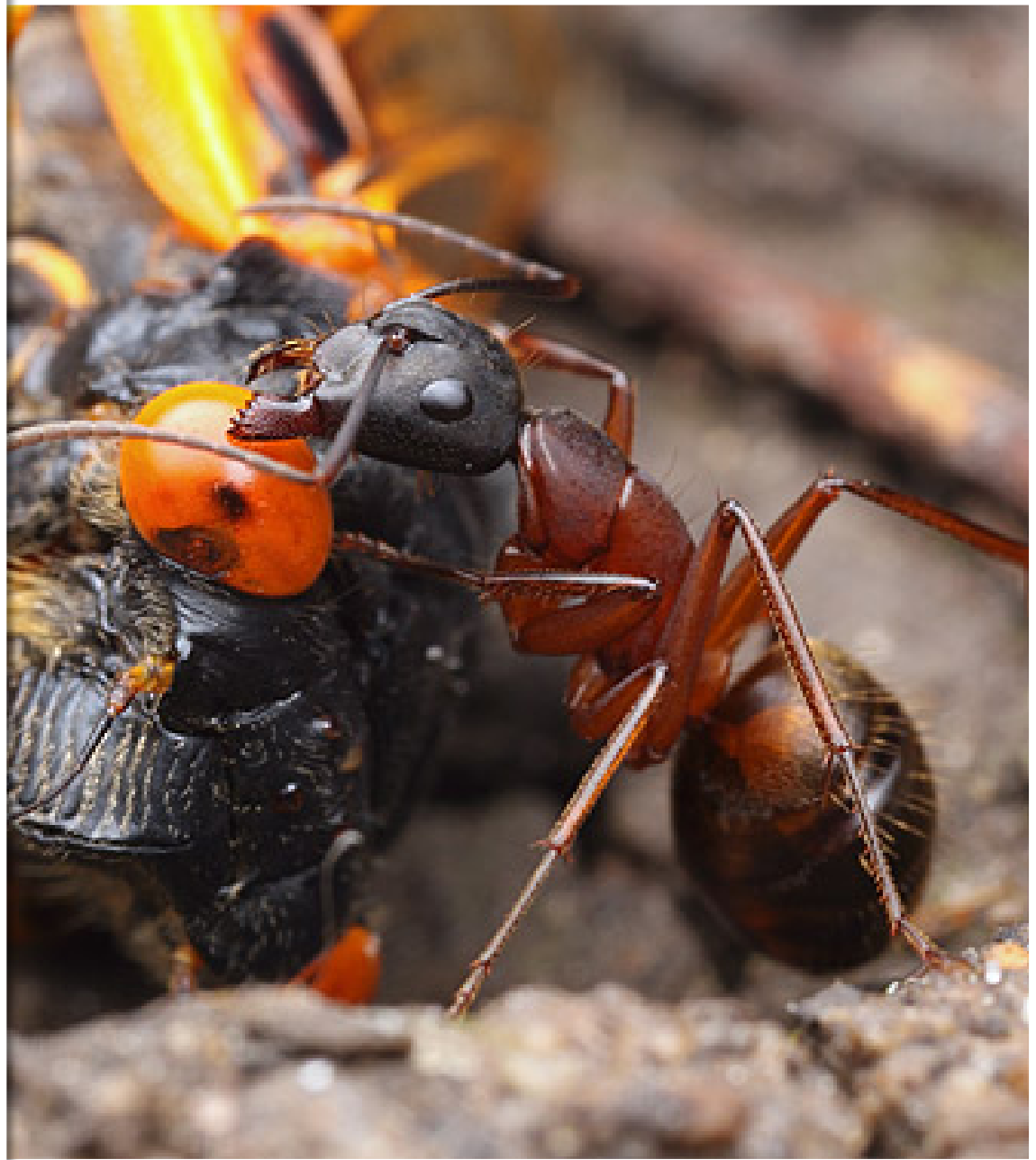


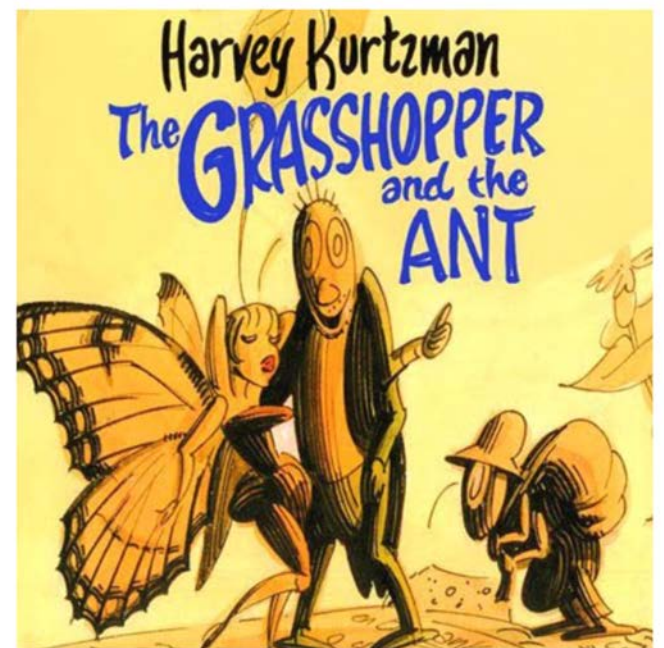
CERTAINLY.  
 $K - \frac{4\pi^3}{7} \sqrt{P} \dots 4 \cdot \frac{\Sigma L}{5T}$



J.P. KANTIS

- **MAKE YOUR  
RESEARCH  
INTERESTS MORE  
WIDELY KNOWN**

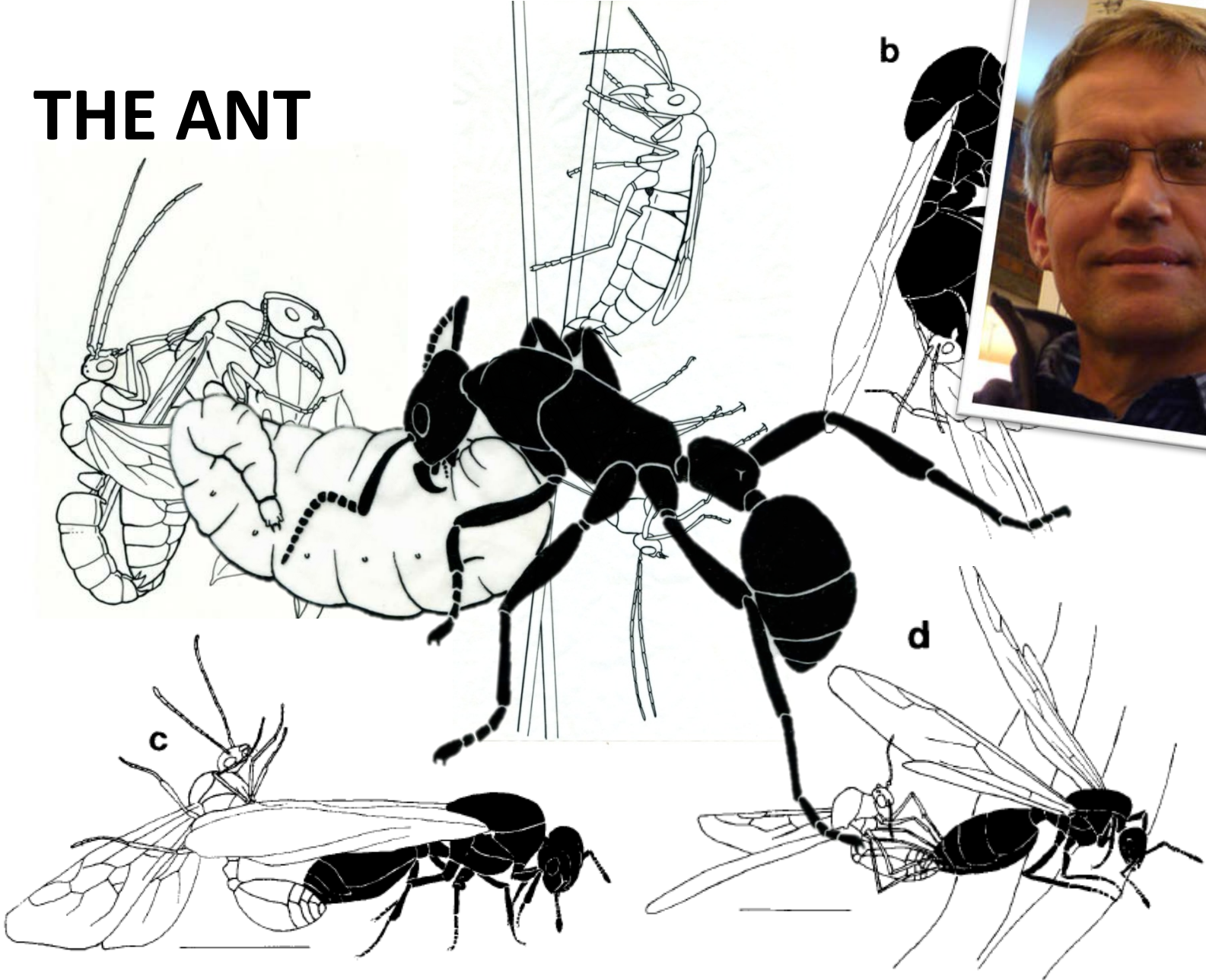






ThePeoplesCube.com

# THE ANT







Sperm morph

Departm  
Re

Tissue & Cell



Sperm morph  
(He

Abraham

Department of Zoolo

Received 8

Tissue & Cell

*Acta Zoologica* (Stockholm) 88: 337–348 (October 2007)

doi: 10.1111/j.1463-6395.2007.00285.x

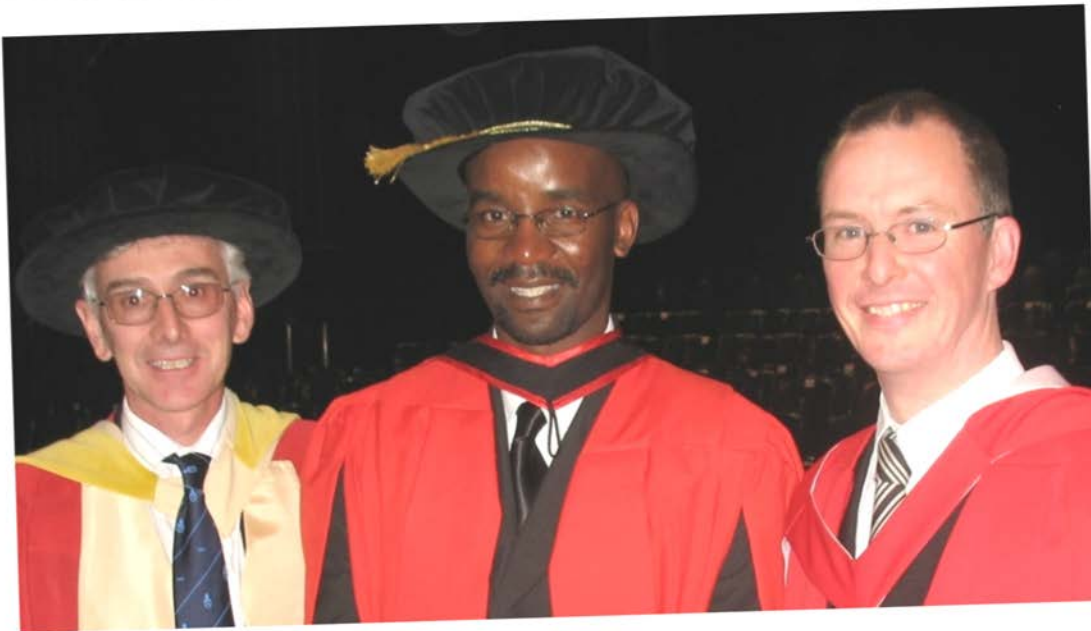
## Spermiogenesis in three species of cicadas (Hemiptera: Cicadidae)

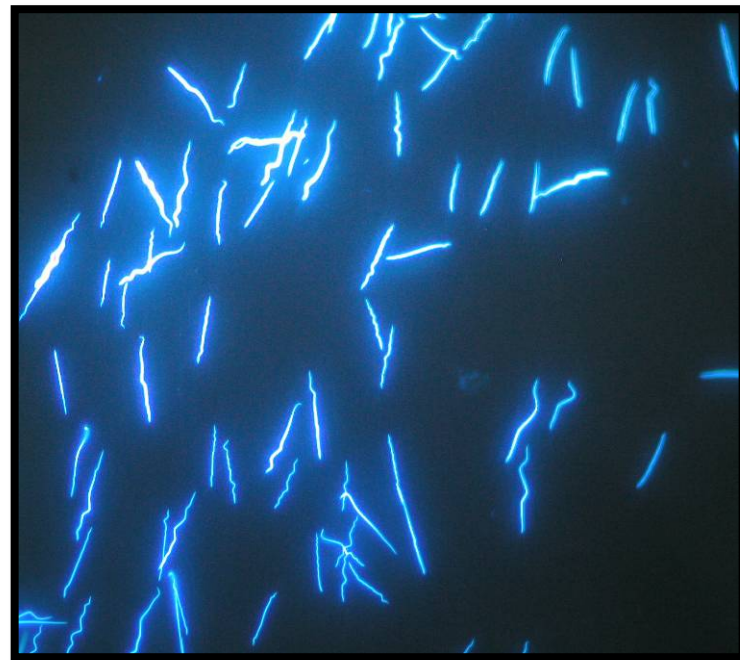
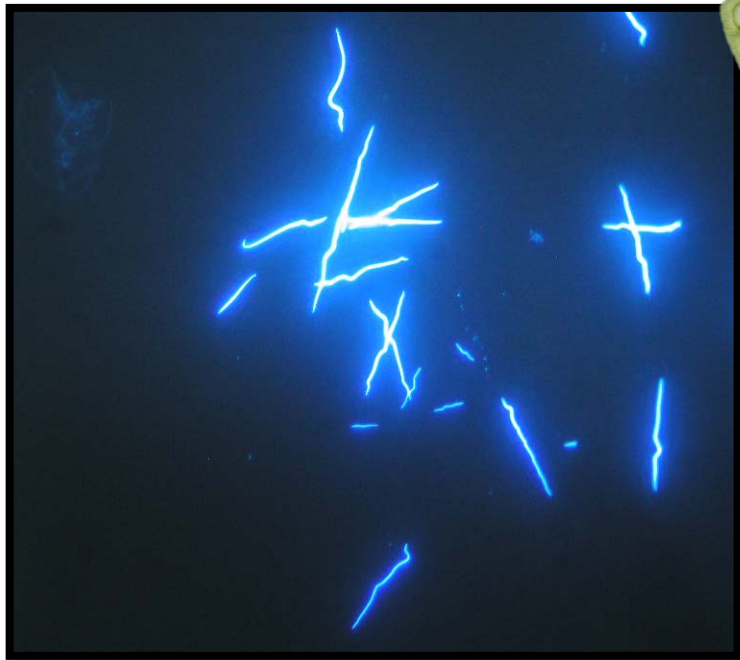
Abraham S. Chawanji,<sup>1</sup> Alan N. Hodgson,<sup>1</sup> Martin H. Villet,<sup>1</sup> Allen F. Sanborn<sup>2</sup> and Polly K. Phillips<sup>3</sup>

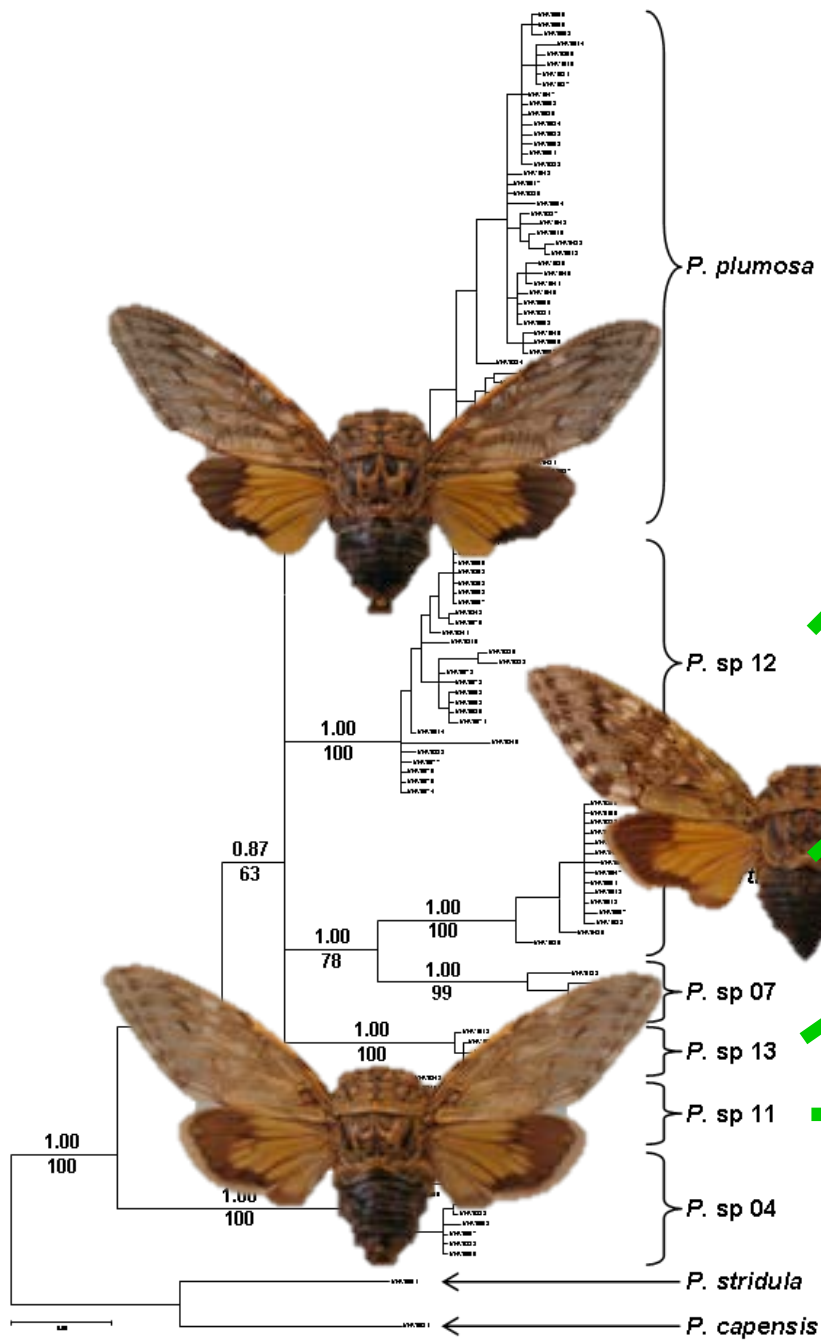
Hodgson, A.N., Villet, M.H., Sanborn, A.F. and Phillips, P.K. Spermiogenesis in three species of cicadas (Hemiptera: Cicadidae). — *Acta Zoologica* (Stockholm) 88: 337–348

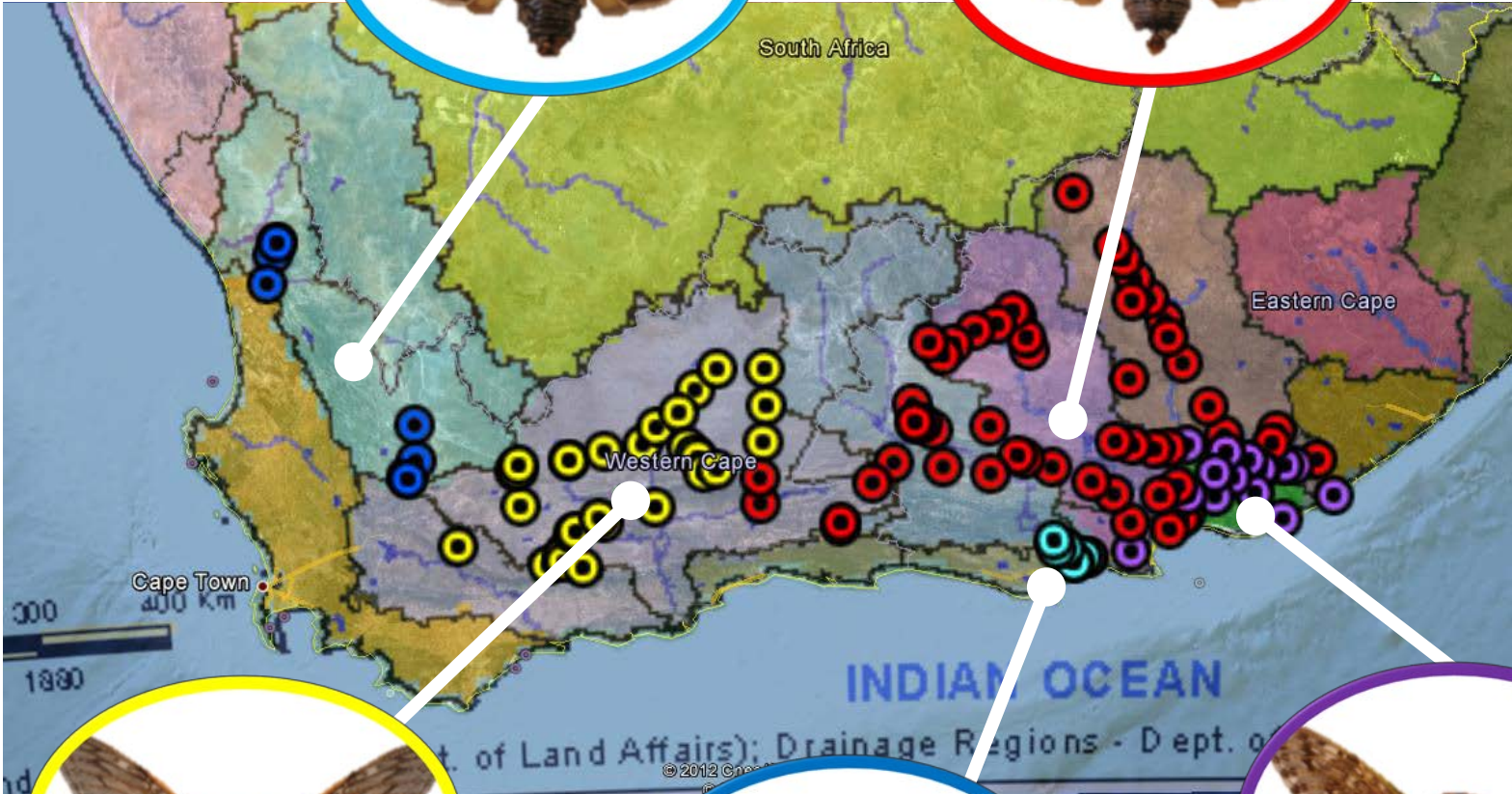
Spermiogenesis in three species of cicadas representing one cicadettine (*Diceroprocta matoposa* Boulard) and two cicadines (*Diceroprocta biconica* [Walker] and *Kongota punctigera* [Walker]) was investigated by light and electron microscopy. Although spermiogenesis was occurring in the testis of all species, earlier spermiogenic stages were observed in *D. matoposa* only. While spermiogenesis was similar to that described for other cicadids, differences were noted. For example granular material did not surround the centriole to form a centriolar adjunct but did accumulate in the cytoplasm of early spermatids adjacent to a region of the nuclear envelope where nuclear pores were aggregated. In late spermatids this material accumulated anterior to the mitochondrial derivatives in a developing 'centriolar adjunct' by previous authors, its formation away from the centriole is questioned about its true identity. Second, during acrosome maturation in the acrosomal region of cytoplasm develops. Although present in later stages, this region is lost in spermatozoa. Interspecific variations in the condensation patterns and the number of microtubule layers in the spermatid nucleus during spermiogenesis were noted.

A. N. Hodgson, Department of Zoology and Entomology, Rhodes University, PO Box 94, Grahamstown 6140, South Africa.  
A.Hodgson@ru.ac.za



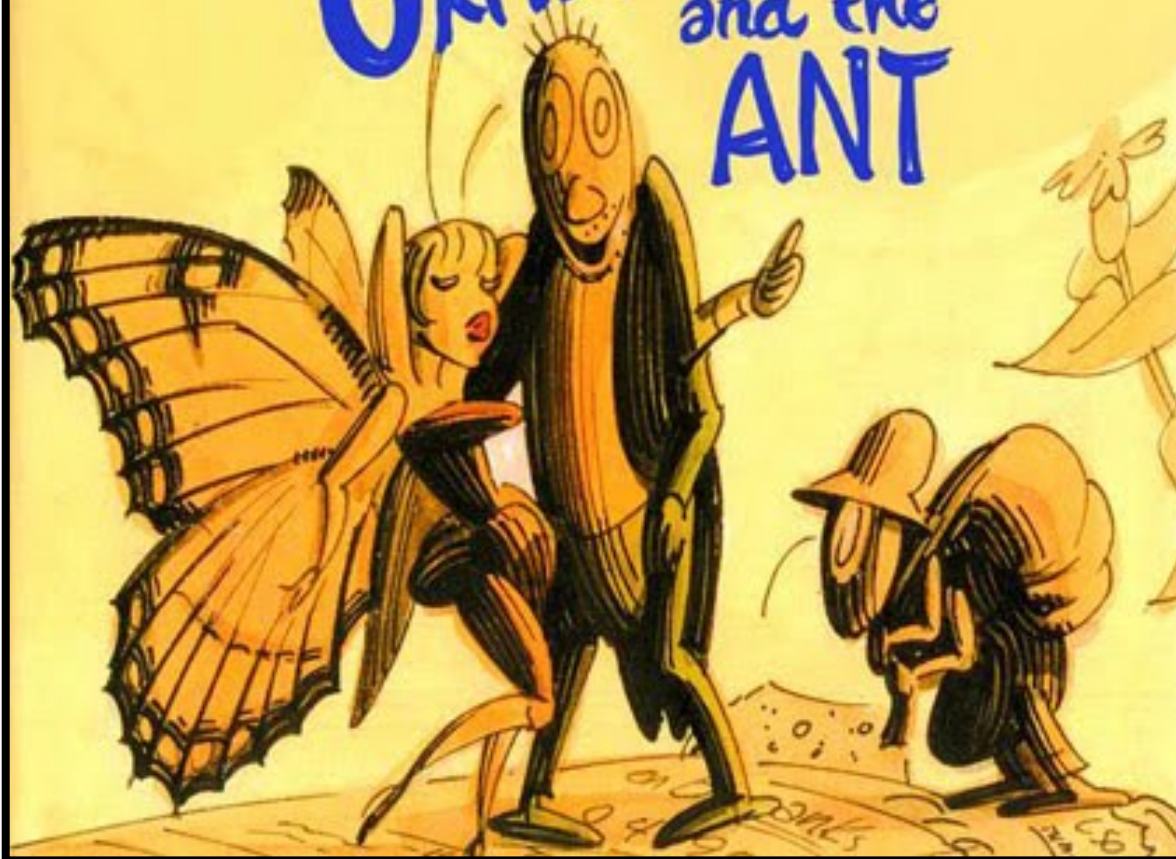


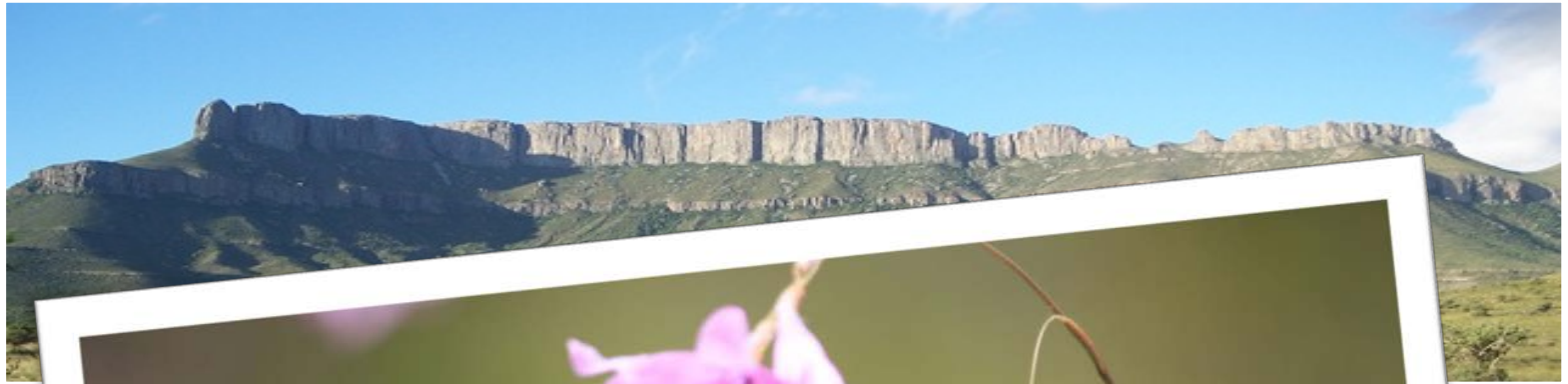


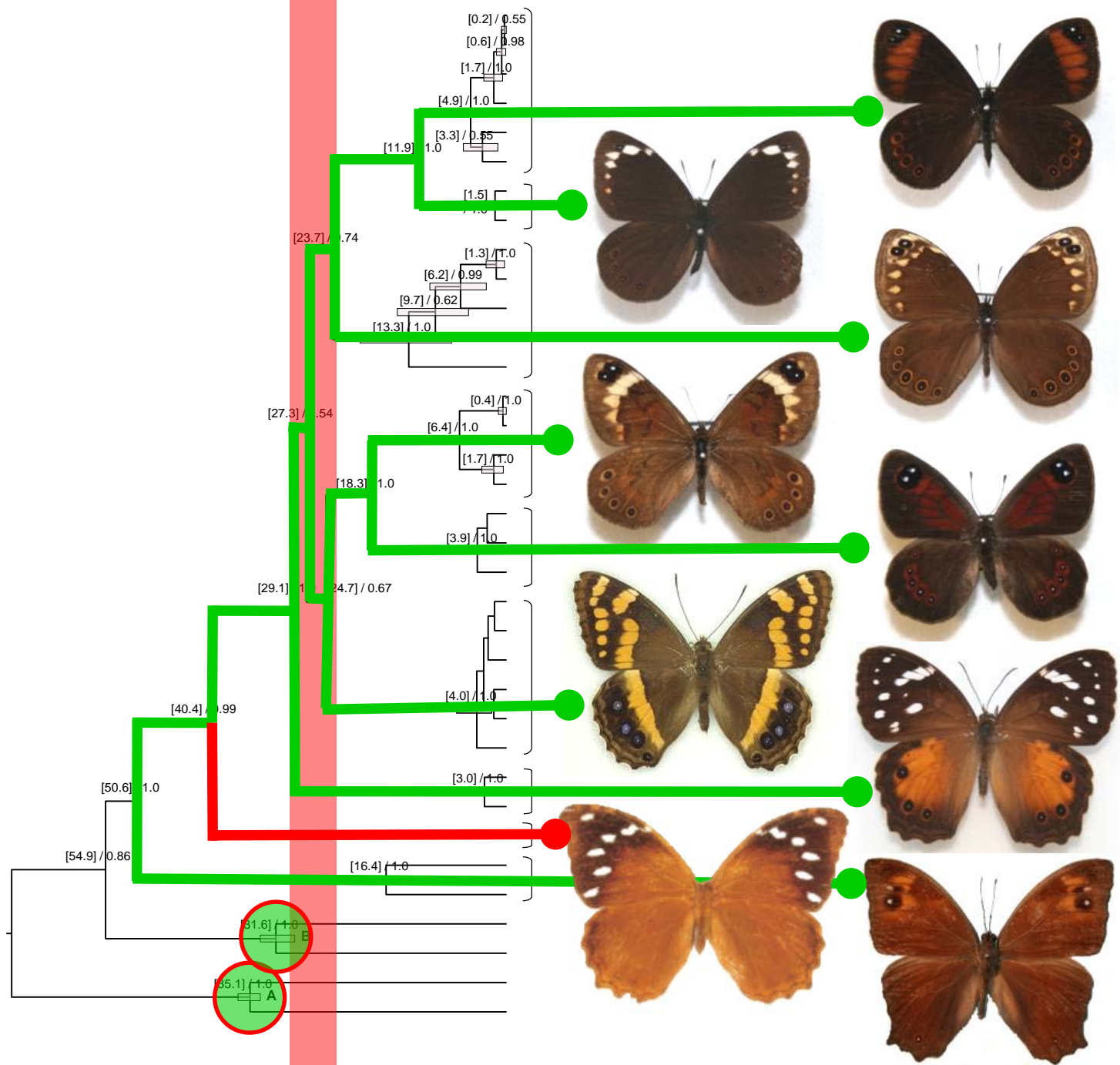




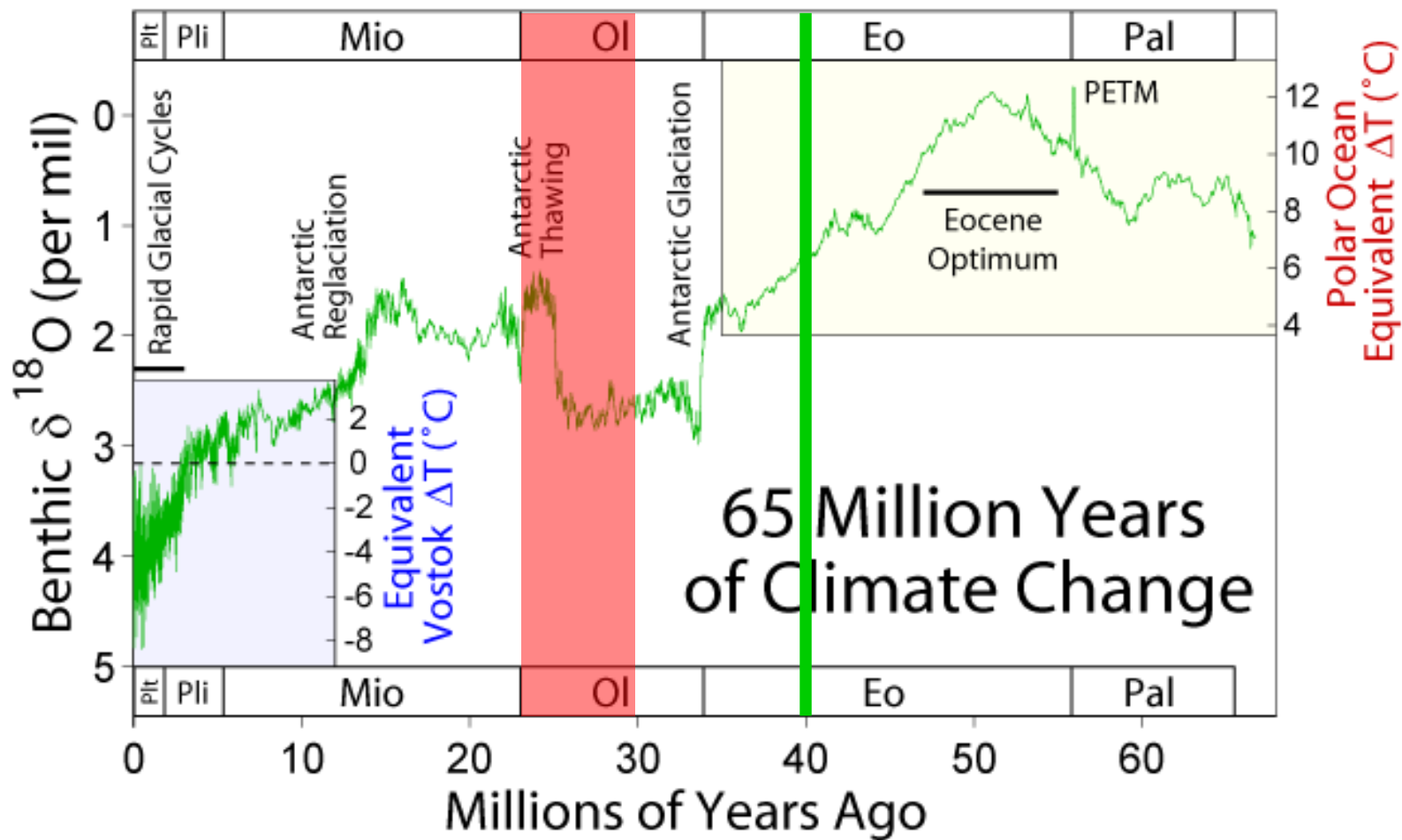
Harvey Kurtzman  
The GRASSHOPPER  
and the  
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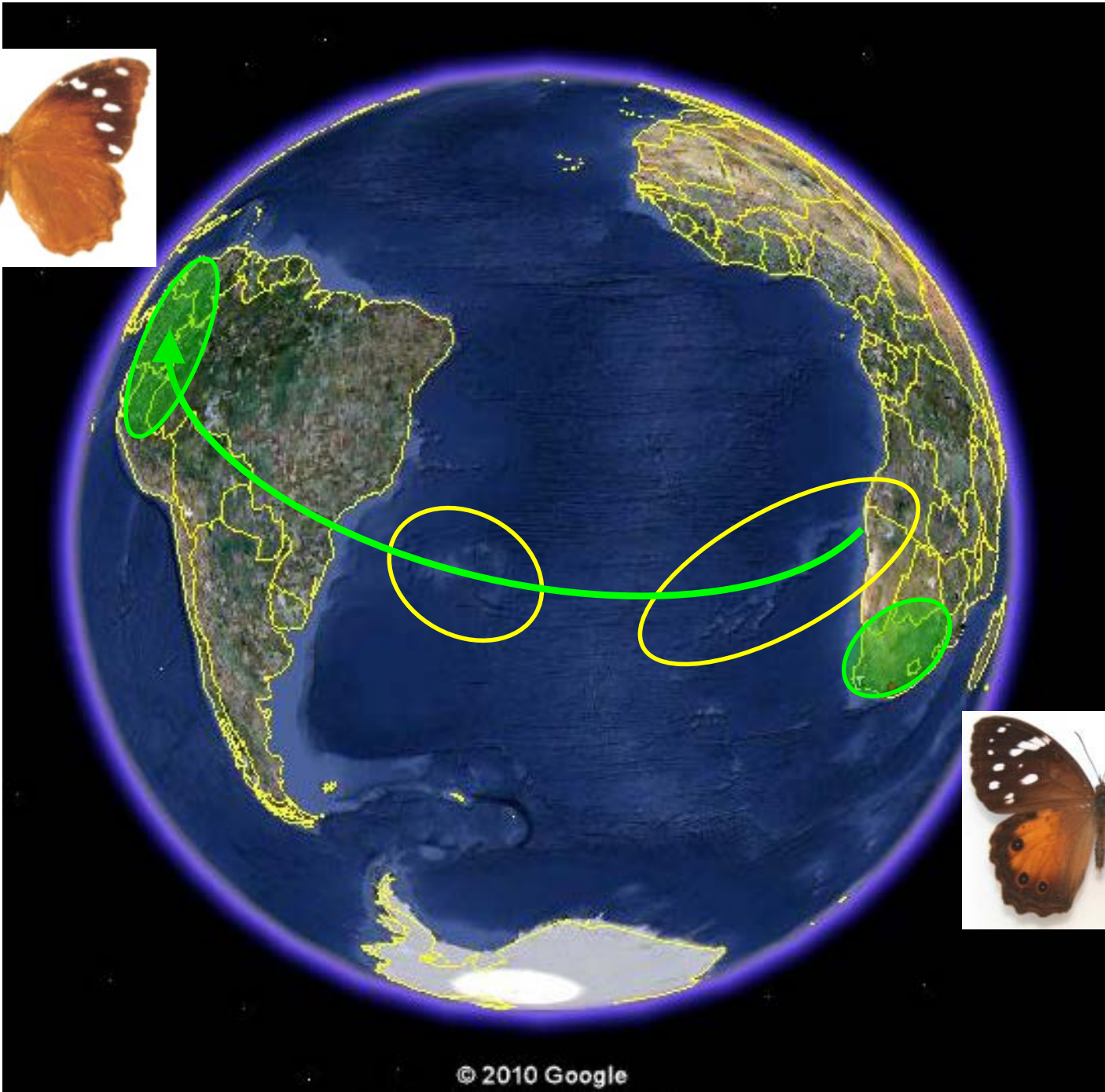


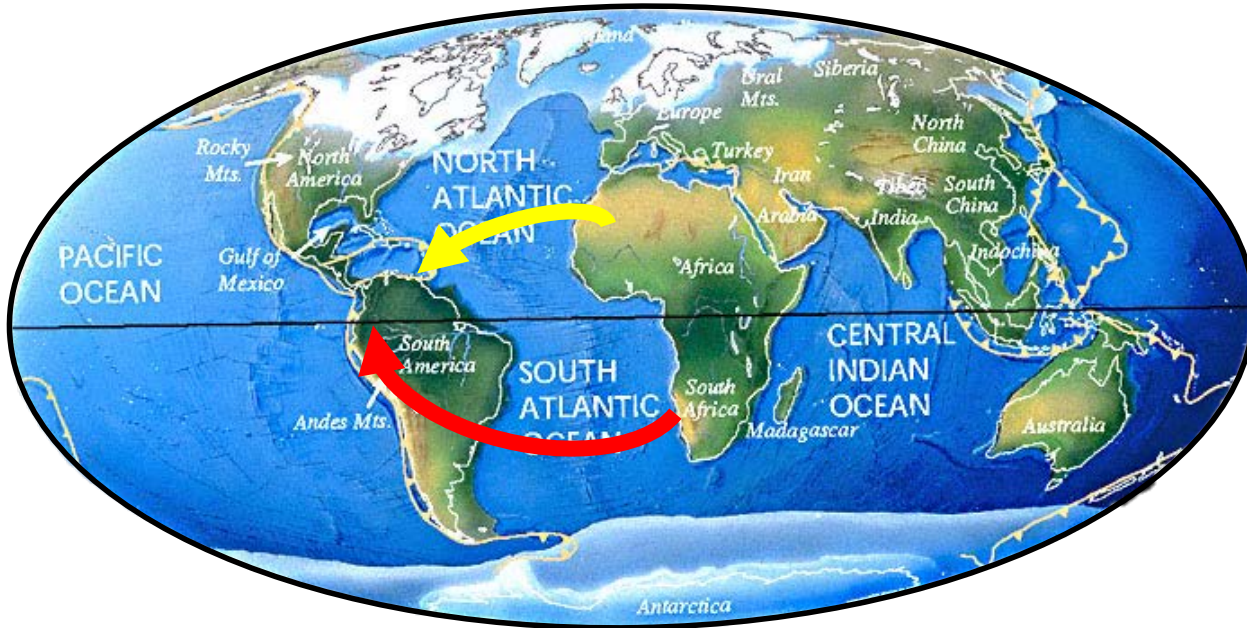












**18 000 years ago**  
**40 000 000 years ago**



# Using molecules and morphology to infer the phylogenetic relationships and evolutionary history of the Dirini (Nymphalidae: Satyrinae), a tribe of butterflies endemic to Southern Africa

BEN W. PRICE<sup>1</sup>, MARTIN H. VILLET<sup>1</sup>, SHAUN M. WALTON<sup>1</sup>  
and NIGEL P. BARKER<sup>2</sup>

<sup>1</sup>Department of Zoology and Entomology, Rhodes University, Grahamstown, South Africa and <sup>2</sup>Department of Botany, Rhodes University, Grahamstown, South Africa

**Abstract.** The first empirically for the southern African endemism from the morphology and ecology and portions of the mitochondrial genes *elongation factor 1 $\alpha$*  (*Ef1 $\alpha$* ) to infer the relationships of using four genera from the Melanitini parsimony and Bayesian methods using two fossil calibrations of the tribe and each in-genera sister-taxon relationship nearly simultaneous radiations *Torynesis*, and the appearance about 40 Ma. Estimates of two major radiations in mid-late Oligocene, second in the early-Pliocene Africa and the spread that dirine larvae probably be partly a taxonomic climate-related phenomenon. Experiments should



- **TALK A LITTLE  
ABOUT YOUR  
METHODS AND  
APPROACHES TO**

- research,
- publishing and
- postgraduate supervision

# **METHODS AND APPROACHES TO RESEARCH**

# MY METHODS AND APPROACHES TO RESEARCH

*“If we knew what it was we are doing, it would not be called research.”*

Albert Einstein



# **EXPLANATION**

***Why do I have ants in my kitchen?***

***Why do mosquitoes exist?***

***What are insects good for?***



# EXPLANATION



**...GOD DID IT**

# EXPLANATION

Theoretical / Deductive

Rational

Darwin

Da Vinci

Internal

External

Basic



Aristotle - Why?



Applied

Pure

Technical

Galileo

Redi

Experimental / Inductive

Material



# KNOWLEDGE PRODUCTION

- **Mode One Knowledge** – “traditional” disciplinary knowledge in which universities are typically engaged, i.e. discipline-centred research
- **Mode Two Knowledge** – “modern” interdisciplinary knowledge uncommon in universities, constructed around solving problems



*"I'm on the verge of a major breakthrough, but I'm also at that point where chemistry leaves off and physics begins, so I'll have to drop the whole thing."*

*Gibbons et al., 2004*

# RESEARCH VS DEVELOPMENT

Focus on *making* knowledge

Creative

Opportunistic

Intensely personal

Success is unpredictable

Benefits are global and  
society-orientated

Public activity

Publication expected

Focus on *using* knowledge

Derivative

Goal-constrained

Commonly collaborative

Success is probable

Benefits are local and  
sponsor-orientated

Proprietary activity

Publication not necessary

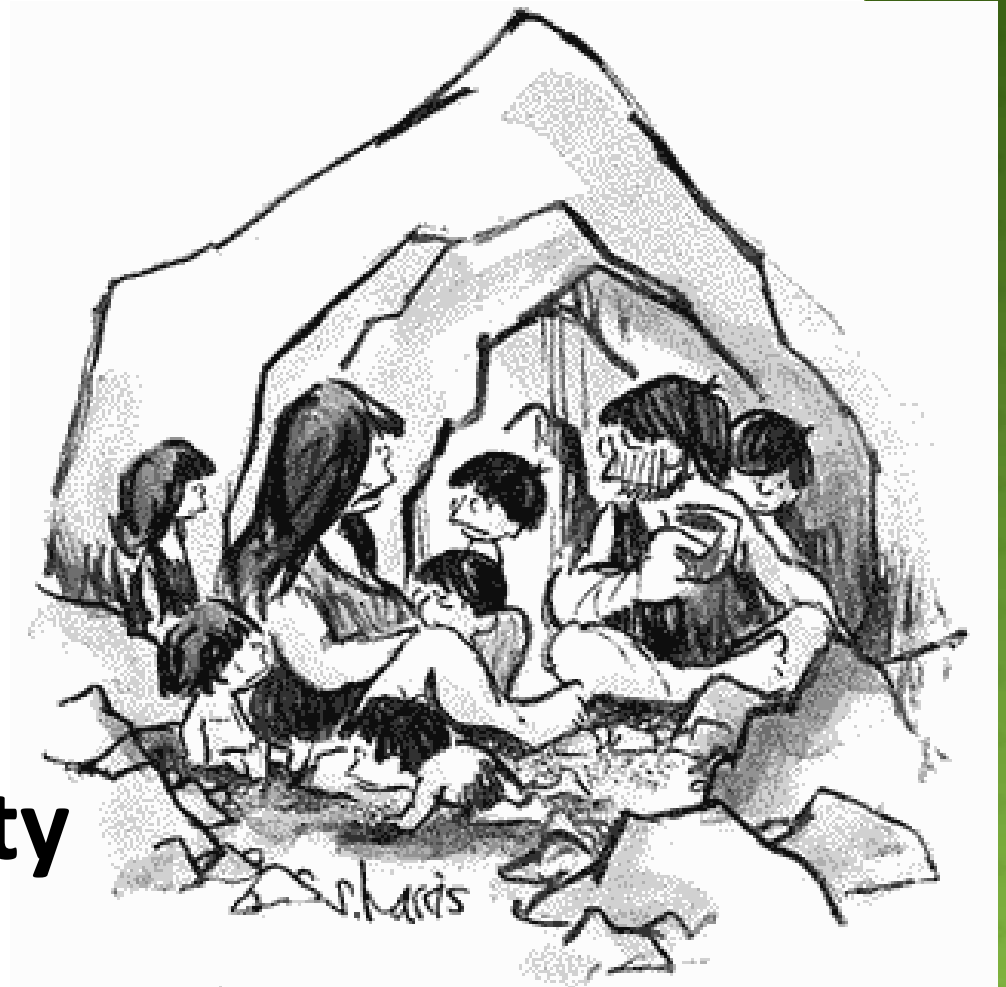
# SCIENCE AND TECHNOLOGY

“There will be no jobs in applied science in 20 years if we are not doing fundamental research. Basic science feeds the applied science pipeline. They are deeply complimentary to one another. Everybody knows the applied work is important, but frankly, you can’t do it without the basic stuff”

Shirley Tilghman,  
President of Princeton, 2011

# WHAT'S KNOWLEDGE GOOD FOR ANYWAY?

- ◎ Simplification
- ◎ Prediction
- ◎ Personal Security



"How can we prevent pregnancy? We don't even know what causes it."

Theoretical / Deductive  
Rational

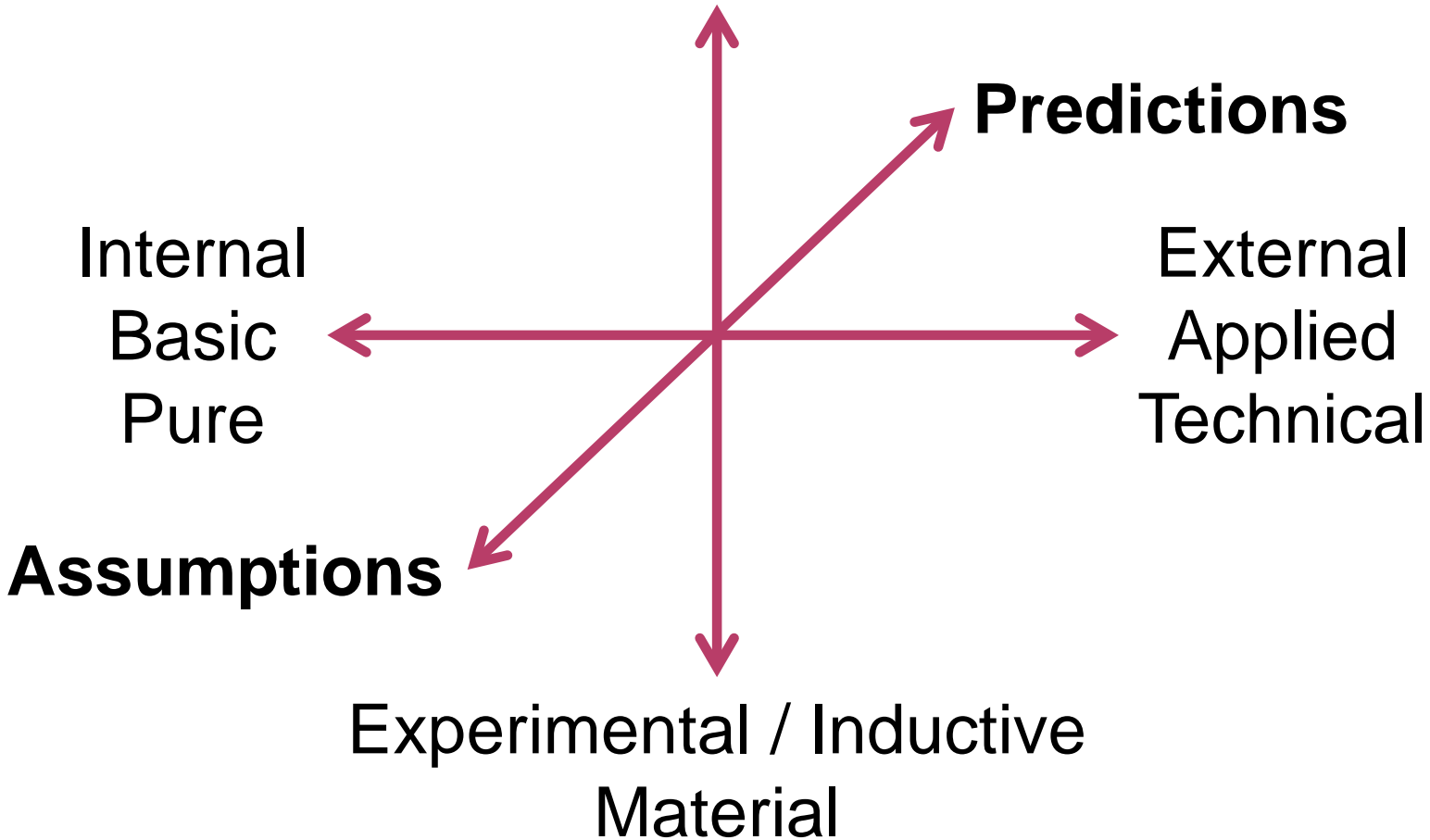
**Predictions**

Internal  
Basic  
Pure

External  
Applied  
Technical

**Assumptions**

Experimental / Inductive  
Material



# KNOWLEDGE AND PREDICTION

- ⦿ Knowledge is of no real value if all you can tell me is what happened yesterday.

- Richard Feynman

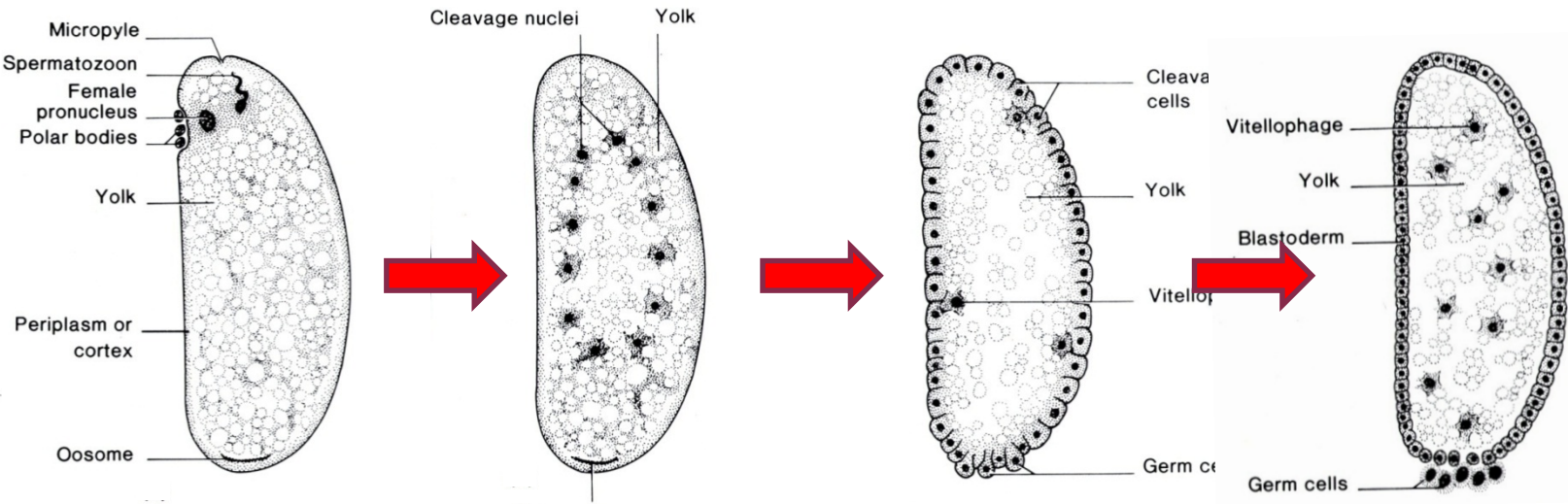


# FORENSIC ENTOMOLOGY

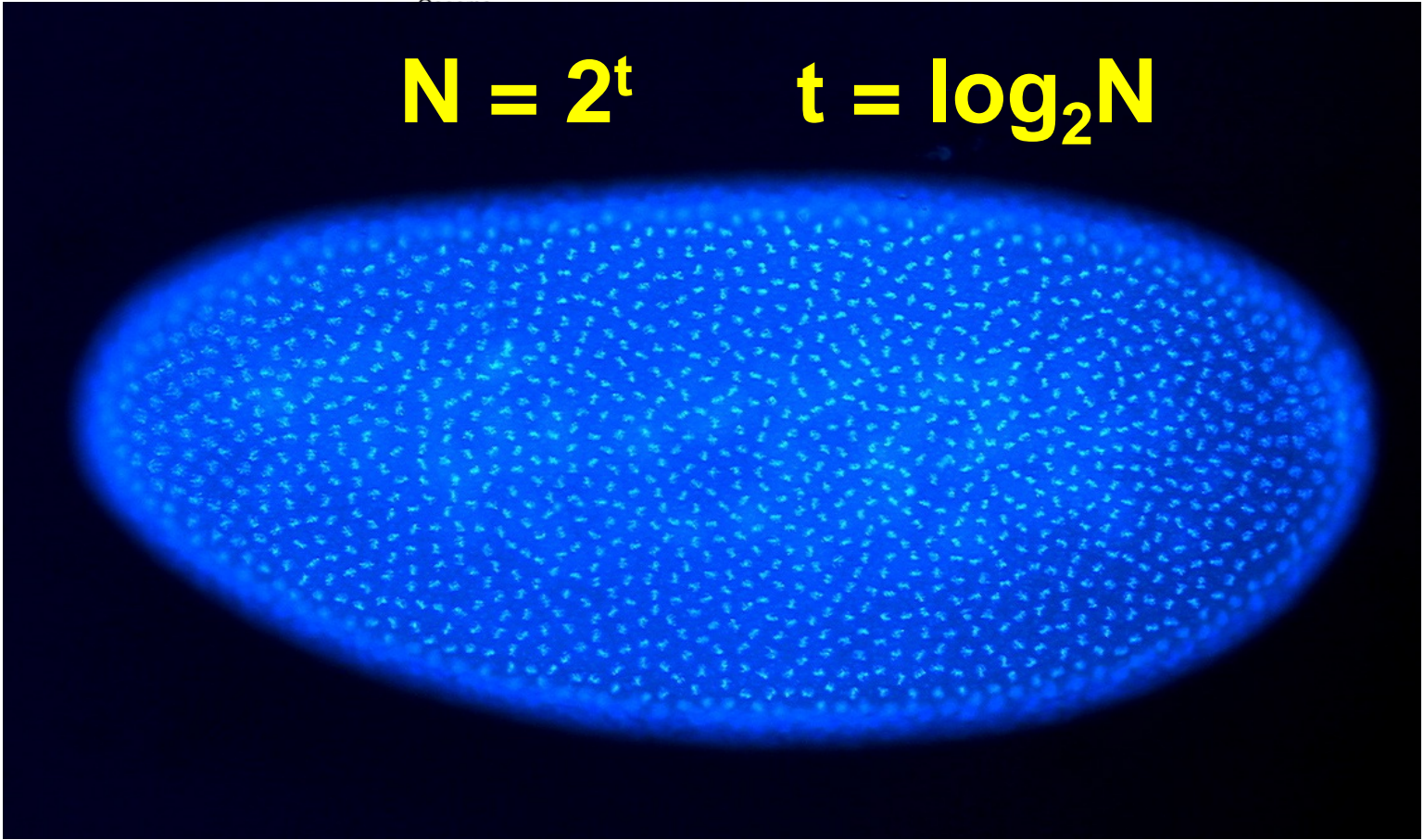


# HOURS





$N = 2^t$        $t = \log_2 N$



# DAYS



# WEEKS



Fresh

Bloated

Active decay

Advanced decay

Dry remains

0

1

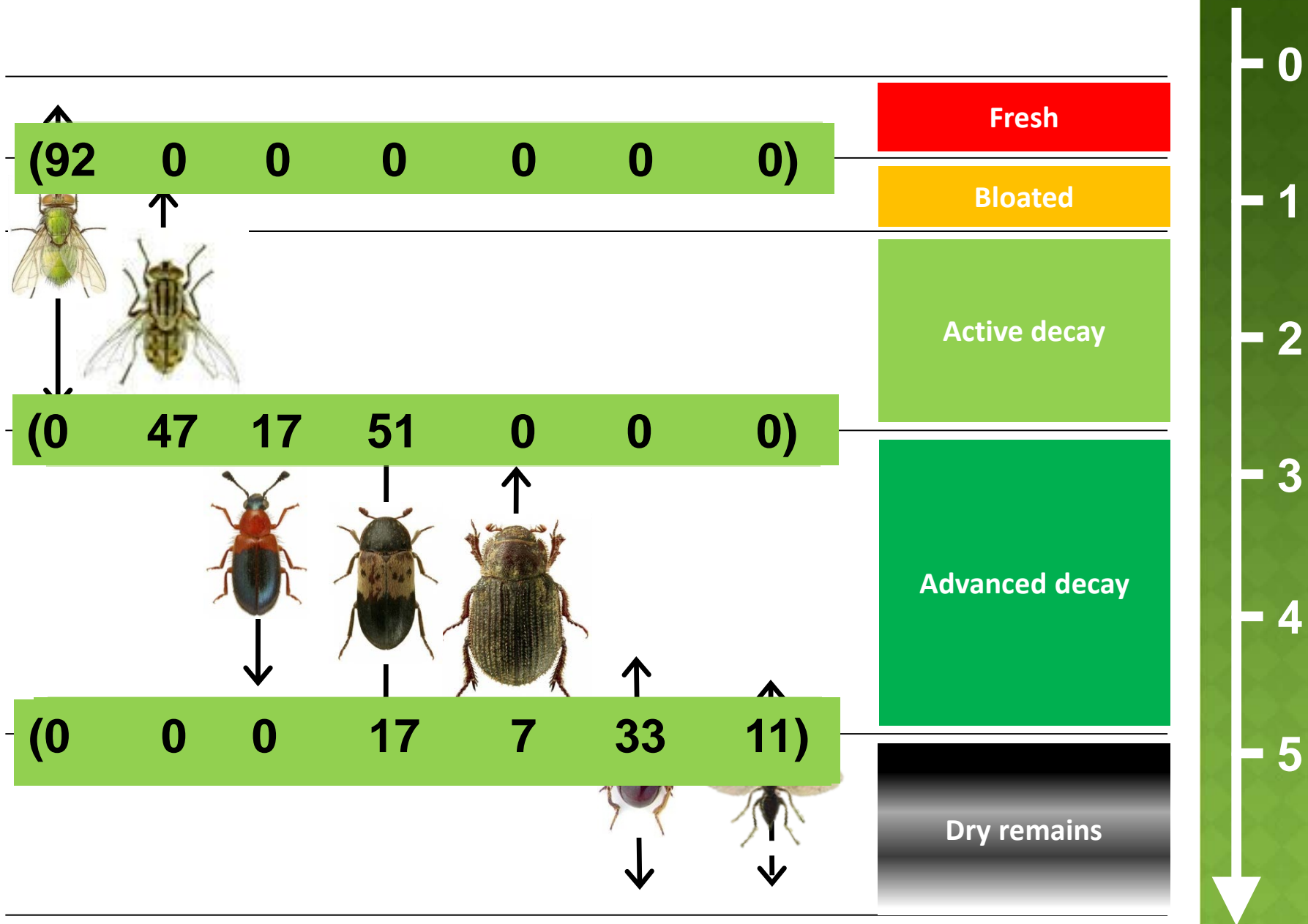
2

3

4

5





# MONTHS

*Pest Technology* ©2011 Global Science Books

## African Carrion Ecosystems and Their Insect Communities in Relation to Forensic Entomology

Martin H. Villet

Southern African Forensic Entomology Research Laboratory, Department of Zoology and Entomology, Rhodes University, Grahamstown, 6140 South Africa  
Corresponding author: \* M.Villet@ru.ac.za

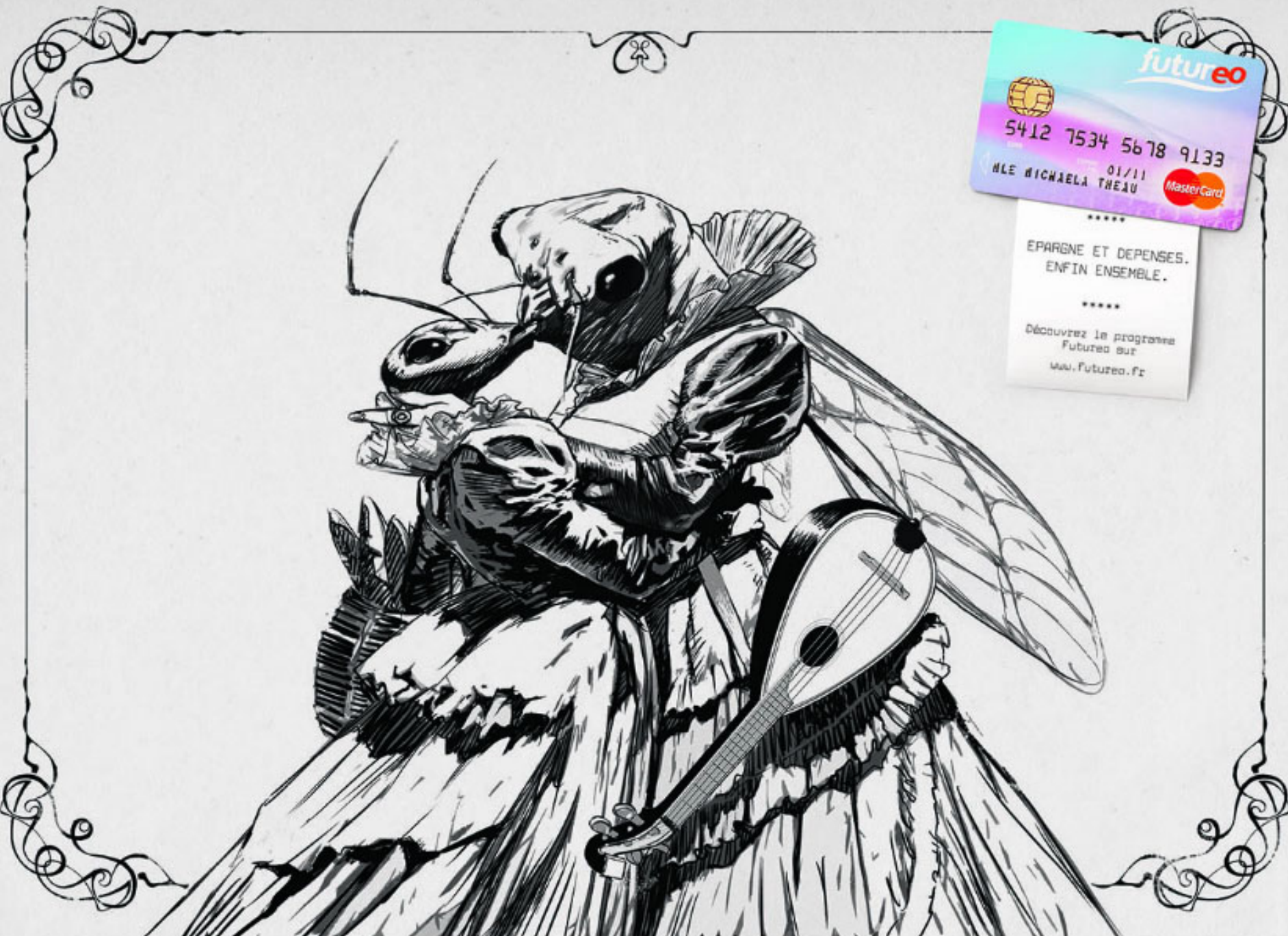
### ABSTRACT

African carrion communities contain representatives of the same families that occur in carrion communities on other continents. Checklists and identification guides are tabulated, and the natural histories of core members of the terrestrial community are outlined. Because of strong phylogenetic trends in the biology of the families, the species are effectively ecological surrogates of their relatives elsewhere. These phylogenetic trends also allow the definition of a set of guilds of functionally equivalent species that unify the study of carrion communities world-wide, and a revised suite of guilds is described with both synecological and forensic purposes in mind. Although the decomposition process has been arbitrarily subdivided into stages, they have little direct relation to the dynamics of the carrion community, and should be treated as landmarks rather than phases. Community turnover follows a qualitatively predictable succession, with the greatest species richness and diversity around the ecotone-like transition from 'wet-phase' to 'dry-phase' carrion habitats. These habitats are differentiated along interacting ecological gradients of dietary quality, competition, and risk of predation, which are important to the core guilds. Competition and predation have strong effects on population dynamics of community members, but link particular species only weakly, so that the succession pattern largely reflects the autecology of the individual species. Discrete waves of species are absent, which increases the temporal resolution, and therefore the forensic value, of the succession as a 'clock'. The forensic significance of various aspects of community and trophic dynamics are discussed, and means of applying ecological theory to investigations are reviewed.



9

Winter  
Autumn  
Summer  
Spring



\*\*\*\*\*  
EPARGNE ET DEPENSES.  
ENFIN ENSEMBLE.  
\*\*\*\*\*  
Découvrez le programme  
Futureo sur  
[www.futureo.fr](http://www.futureo.fr)



**METHODS AND  
APPROACHES TO  
PUBLISHING**

# A history of southern African research relevant to forensic entomology

K.A. Williams<sup>1</sup> and M.H. Villet<sup>2</sup>

Entomological forensic evidence has been used in southern Africa for decades but explicitly forensic research in southern Africa only 26 years ago. Although forensic entomology is well established in many countries, it is still a relatively new discipline in southern Africa. Much of the research in forensic entomology in southern Africa has been in the area of blowflies (Diptera: Calliphoridae).



Forensic Science International 120 (2001) 37–41

Forensic Science International

www.elsevier.com/locate/forsciint

## Preliminary observations on the effects of hydrocortisone and sodium methohexital on development of *Sarcophaga (Curraea) tibialis* M.

Medical and Veterinary Entomology (2004) 18, 445–448

### SHORT COMMUNICATION

## Recent African derivation of *Chrysomya putoria* from *C. chloropyga* and mitochondrial DNA paraphyly of cytochrome oxidase subunit one in blowflies of forensic importance

J. D. WELLS<sup>1</sup>, N. LUNT<sup>2</sup> and M. H. VILLET<sup>2</sup>  
<sup>1</sup>Department of Biology, West Virginia University, Morgantown, West Virginia, U.S.A. and <sup>2</sup>Department of Zoology & Entomology, Rhodes University, Grahamstown, South Africa

#### Abstract

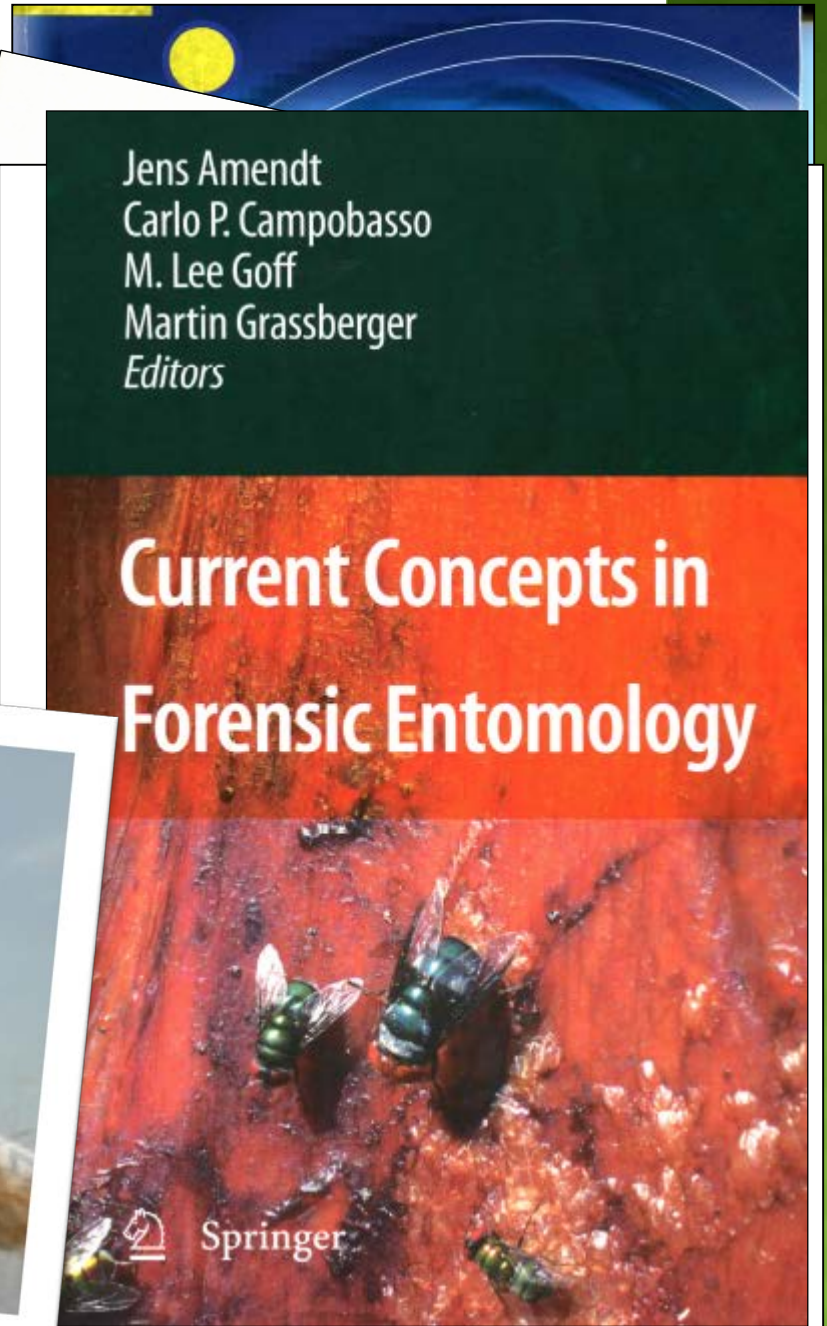
Larvae of *Sarcophaga tibialis* fed a steroid or a barbiturate showed significantly longer to reach pupation and pupation significant development time treatments, imply by the involvement of barbiturates. The Ireland Ltd. All

Keywords: *Sarcophaga tibialis*

**Abstract.** *Chrysomya chloropyga* (Wiedemann) and *C. putoria* (Wiedemann) (Diptera: Calliphoridae) are closely related Afrotropical blowflies that breed in carrion and latrines, reaching high density in association with humans and spreading to other continents. In some cases of human death, *Chrysomya* specimens provide forensic clues. Because the immature stages of such flies are often difficult to identify taxonomically, it is useful to develop DNA-based tests for specimen identification. Therefore we attempted to distinguish between *C. chloropyga* and *C. putoria* using mitochondrial DNA (mtDNA) sequence data from a 593-bp region of the gene for cytochrome oxidase subunit one (COI). Twelve specimens identified a total of five haplotypes, none being unique to either species. We distinguished between the two species by phylogenetic analysis.







DAVID M. LAMBERT AND HAMISH G. SPENCER

### WHAT'S WRONG WITH FHM?

In "Bad Girls" (Reporter, February 2004) you say Carl Butry resides at the "Institute For Women, California". This is an error, unless the said institute is a graveyard, as she died on 9 December 2003, aged 61.

HEIN MORTIE, VIA E-MAIL

In "The Big Quiz" (Reporter, March 2004) question 10 involves a pattern of square numbers. But 4 times 4 is in fact 16 and not 14. Pay up!

CARL BOSTER, VIA E-MAIL

In "Reporter" (March 2004), you lauded the Panasonic D-snap camera at only \$300! Awesome, I thought, I must get myself one. But when I dialled the

number you printed, it wasn't Panasonic and the dude on the other end had no idea what I was on about. What's the deal with that?

HEIN VAN ZYL, VIA E-MAIL

Sorry Hein, grandma hit again. The number goes for around R3 500, and you can find your nearest stockist by calling 085 517 7777.

One of the gadgets in "Reporter" (February 2004), the Mega Memory Watch, had a digit missing from the phone number. One hundred rood to the SPCA, please.

SHAZN, SPONSOR: You're right. The number should have been 011 883 8812. Beastari!

### Only black people do crime?

I'm a 19-year-old black South African. Why am I reading this magazine when it is predominantly a white mag? The truth is that FHM is really informative magazine. You guys reveal a lot of things that all men love, and I respect that. But I was disturbed by the March issue. I know that FHM has less stuff about "darkies", but that is not my quarrel, we also have our own magazines. The thing that drives me up the Great Wall of China, is that in this issue, you had an article about one of the best heists in South African history ("Highway To Hell"). Why is it that with little context about blacks already, the story that grabs your four-page attention is about blacks doing crime? I know it's an exciting story, and I loved reading it, but in that issue that was basically the only thing written about blacks. If a 12-year-old were to pick up this magazine and the article, might he not think that black people are crime specialists in SA? Let me

ask this: If you guys did not feel a bit sensitive about this article, then why were you scared to show the robbers as black people in the cartoon? C'mon FHM, break down the damn stereotypes already!

SHAZN, SPONSOR: VORVOY

**Response:** For the conscious sortiments, FHM doesn't support racial stereotyping either. But come on chins, check out the last issue.

**Non-criminal darkies** we published stories about included: Channel O's Grace, Molo Omotoso, Hake Berry and Isaac Chaviva. Yes, we are a predominantly white-read mag, but that doesn't mean we set out to portray black chins in a negative light. We ran the heist story because it was the biggest and most dramatic in the post decade, and so the most interesting. The fact that the perpetrators were black didn't come into our thinking. We've run plenty of crime stories in the past involving inebriate whiteys. Peace.

### Seymore Butts

I am a photographer and recently had the pleasure of looking at these butts through the lens of my camera. I just had to share... The lovely young lady agreed to submit the photo, but asked to remain anonymous. Great butts though, don't you think?

DES, HOCKEYPOOR!

### Funnel vision

Sap FHM: This is our funnel (Frank the Tank) that we made for our metric holiday in 2003. We lost count after about 250 people had funnelled with it in

Library, and these chins don't lie... Pay up."

I'm afraid the more you are in your editorial office and at the Science Photo Library. To anyone who has e-n-i-o-m-i-n-a-l-i-c-a-l (I spell it out so that you morons can look it up in the dictionary) training, it is obvious that you do not know a dung beetle and definitely not a mite - check it out with any entomologist or acarologist (a mite specialist). Perhaps you could ask the dung beetle to remove the splashes of cow poot from your eyes. You in fact

## LETTERS

entomology at Mites for many years. It seems you have a very well-educated class of reader.

The beetle is a scarab beetle, and probably a species of Aphodius - which is a group of dung beetles. Prof Clarke Scholtz at Tukkie would probably be able to pinpoint the identification to species. If it is an Aphodius, the beetle would be about 5mm long, which means that the stated magnification would be (very) inaccurate. I'm glad to see folks taking such an interest in nature!

PROF MARTIN VILETT, PERDORIC ENTOMOLOGIST, RHODES UNIVERSITY

Okay, it's a beetle. And we'll pay up. Twice. But you really need to let it go now, Henk.

### Grant Panty

I was your mailman, and there have been rumours that he has a fetish for ladies underwear, but an one could provide proof. After many drinks this New Year's

we all decided to find the truth. We managed to get his rods off and in and behold... there they were! Not only were they pink panties, but they were for a girl aged 13 years! His nickname is now "Grant Panty" and it suits him, 'cause he acts like a girl sometimes!

EMERSON MURKIN, VIA E-MAIL

**UUUUUUUUUUHHH! Nasty!** Make him stop. We used to love panties here in the FHM mailroom. Don't sell them for us, Grant. By the way, our fashion assistant Kirsty Stoltz says, "Nice package!"



APRIL 2004 FHM 13

# arsting



## squad



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...how is concerned not only with forensic entomology is heard in fact, it can be subdivided forensic medico-legal forensic entomology is the one most familiar public, while urban, sternal, and environmental forensic entomology is based on the opinion of insects that are typically soil, but also tends to reflect the sex of law and the types of client forensic entomologists encounter. Though the distinctions are somewhat fluid, they help to outline the diverse nature of this kind of work.

**an forensic entomology** branch of the discipline is usually concerned with insects and people's homes, and usually not to issues governed by criminal or civil law, so the clients are usually private individuals and all businesses. The overwhelming majority of insects in these cases are by-night pests like house beetles, cockroaches, and stored food. The subject of the investigation might be the comparison of insect specimens and the detection of insecticide residues. Do the swarms of flies on the house really come from the street down the road? If the were right about treating

**METHODS AND  
APPROACHES TO  
POSTGRADUATE  
SUPERVISION**

# Undergradese

What undergrads ask vs. what they're REALLY asking

"Is it going to be an open book exam?"

Translation: "I don't have to actually memorize anything, do I?"

"Hmm, what do you mean by that?"

Translation: "What's the answer so we can all go home."

"Are you going to have office hours today?"

Translation: "Can I do my homework in your office?"

"Can I get an extension?"

Translation: "Can you re-arrange your life around mine?"

"Is this going to be on the test?"

Translation: "Tell us what's going to be on the test."

"Is grading going to be curved?"

Translation: "Can I do a mediocre job and still get an A?"

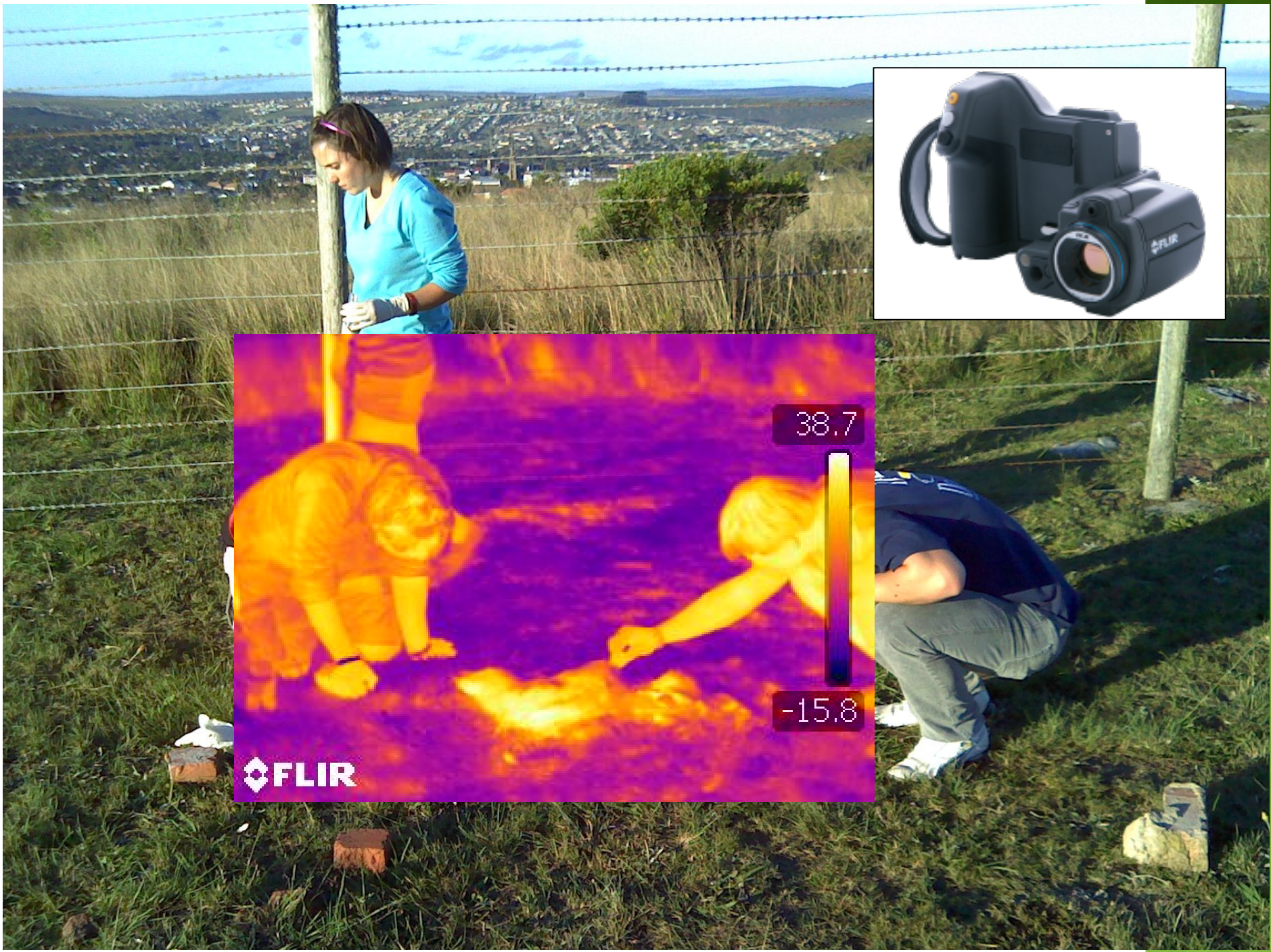


⦿ “And the people shall be oppressed ... every one by his neighbour: ***the child shall behave himself proudly against the ancient, and the base against the honourable.***”

■ Isaiah 3: 5







3000 miles from home: a new *Gastrosericus baobabicus* Pulawski, 1995 (Hymenoptera, Larridae) distribution record highlights that the Sahel has a distinct entomofaunal signature

Effects of prophylactic progesterone in decomposing tissues on the development of *Chrysomya chloropyga* (Wiedeman) (Diptera: Calliphoridae)

C. da Silva & M.H. Villet\*

Department of Zoology and Entomology, Rhodes University, Grahamstown, 6140 South Africa

Medico-legal forensic entomology is often concerned with the estimation of postmortem intervals (PMI), the time elapsed since the death of a body, by estimating the age of maggots if they are found on a body. These estimates can be complicated by the presence of a variety of drugs that may be present in dead bodies, including steroids such as hydrocortisone (Musvasva *et al.* 2001), stimulants like cocaine (Introna, 2001), and barbiturates such as sodium methohexital (Musvasva *et al.* 2001). In this context, Goff *et al.* (1991) emphasized the need for studies of the effects of more such drugs and more species of carrion flies.

Prophylactic progesterones are commonly used as a means of birth control, and may be present in the corpses of women who have been taking them. Since progesterones are steroids, and since some steroids can affect larval development rates (Musvasva *et al.*, 2001), the presence of these contraceptives might complicate estimations of PMI in women, especially since a significant proportion use them. It is therefore important to establish the effects, if any, that these drugs have on the rate of development of carrion flies. This would include determining if there are differences in the effects of these drugs at different stages of the insects' life cycle, and whether the eclosing adults are fertile.

*Chrysomya chloropyga* (Wiedeman) is a common colonizer of corpses in South Africa, which makes

\*To whom correspondence should be addressed.  
Email: m.villet@ru.ac.za

it an obvious and relevant candidate for such an investigation.

The two steroid contraceptives chosen for this experiment were Nur-Isterate (Schering (Pty) Ltd) and Depo-Provera (Pharmacia and Upjohn), both of which are injectable formulations of androgenic anabolic steroids with progestational effects in mammals. Depo-Provera contains medroxyprogesterone acetate (150 mg/dose) and Nur-Isterate contains nortisteron entanate (200 mg/dose). The drugs were mixed into finely ground chicken liver at concentrations (Table 1) of 0%, 25%, 50%, 75% and 100% (w/w) in a freshly treated adult human. The liquid formulation made more difficult to mix with the rearing medium more than the solid formulation.

*Chrysomya chloropyga* was cultured on chicken liver collected from carrion in the Grahamstown area. These were identified and put in plastic bags where they were fed water and dried skimmed milk. Eggs were placed in a Petri dish with 200 g of chicken liver in the dark for 12 h, allowing time for oviposition. Newly-hatched maggots were placed in a Petri dish with 50 g of liver treated with one of the concentrations listed in Table 1. The density of maggots is below the level at which they compete for food or generate significant metabolic heat that could confound the experiment (Goodbrod & Goff 1990). Each concentration of each drug was replicated three times, with a total of 30 replicates involving 3000 maggots.

occuring on wild olives, in Cape of South Africa

artin H. Villet<sup>a</sup>

South Africa; <sup>b</sup>United Kingdom



# EDUCATION VS. TRAINING

“Training is to move people into positions where they can be productive and they are ready for that position. Educating is much broader, in that it gets someone ready for a life to follow. But it also can make them adaptable. It can make them innovators. It can give them curiosities that will enable them to transcend a particular vocational moment and to be ready for a world that is not always predictable and not always immediately definable.”

Drew Faust (President of Harvard)  
*(Financial Times, June 12, 2009)*

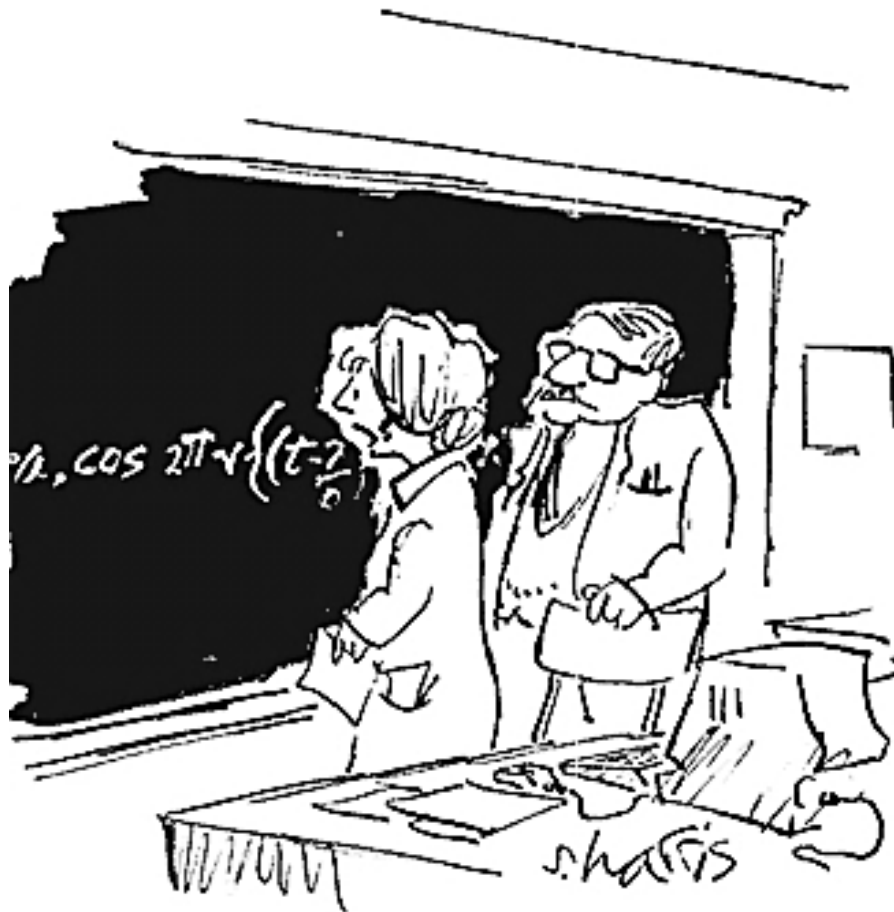
# SCIENCE AND CITIZENSHIP

“A scientific education creates technologists. A liberal arts education creates citizens: people who can think broadly and critically about themselves and the world.”

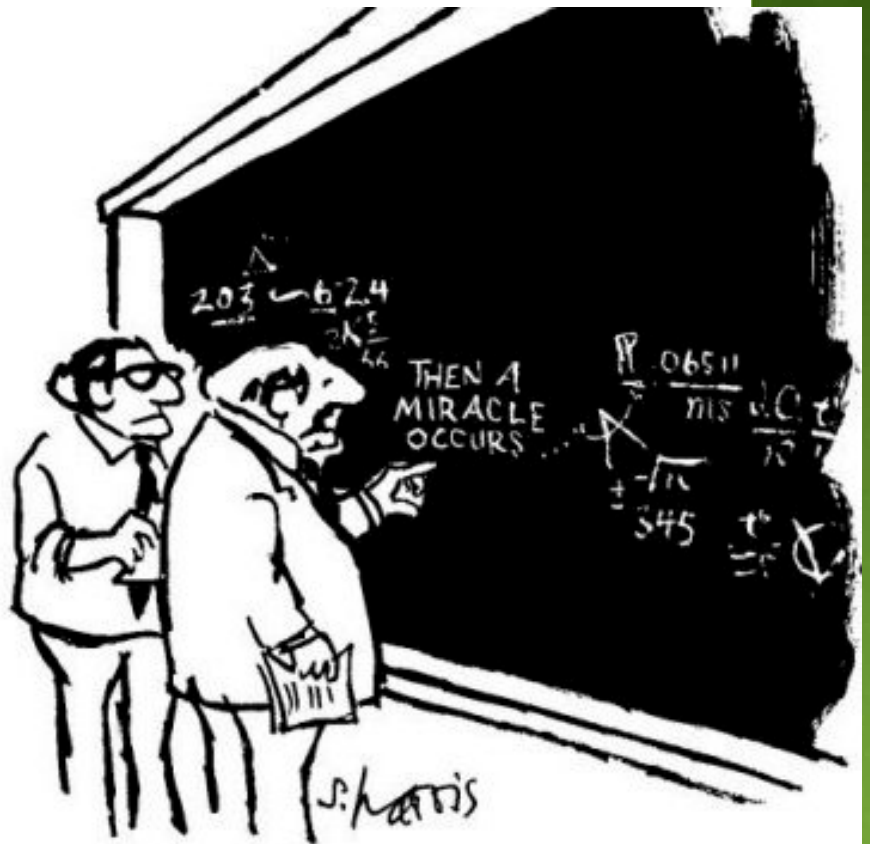
William Deresiewicz

Faulty Towers: The Crisis in Higher Education

The Nation, 23 May 2011



"IT'S AN EXCELLENT PROOF, BUT IT LACKS WARMTH AND FEELING."



"I THINK YOU SHOULD BE MORE EXPLICIT HERE IN STEP TWO."

# SCIENCE AND VALUES

"If I do this what will happen?" That doesn't tell me whether I should do this. We still have another part, which is "Well, do I want that to happen?"

Richard Feynman



"ON THE OTHER HAND, MY RESPONSIBILITY TO SOCIETY MAKES ME WANT TO STOP RIGHT HERE."



# SCIENCE AND MYSTERY

- ⊙ *“... the unreasonable effectiveness of mathematics in the Natural Sciences”*

Eugene Wigner

- ⊙ *“Why nature is mathematical is, again, a mystery”*

Richard Feynman

- ⊙ *“Any sufficiently advanced technology is indistinguishable from magic”*

Arthur C. Clarke



# THE ANT

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# THE CICADA

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“As for myself, I finally got into the swing of science, saw it as the play that it really is, and became enthralled by the discovery of little bits of knowledge and insight that can be gained through persistent questioning and testing.

Make no mistake; the pursuit of science is almost exactly the same as the pursuit of art, and its outputs are often equally abstract and at the same time equally necessary, though sometimes much more practical.”

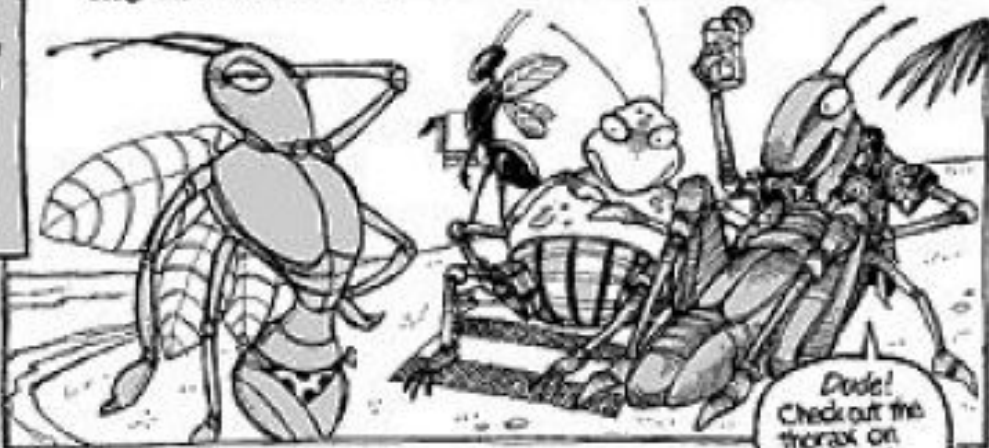
Posted by Doug Downie at 1:36 AM



# The Fable OF THE Ant AND THE Grasshopper

IN THE SPRING,  
THE SENSIBLE,  
INDUSTRIOUS ANT  
PUT ALL OF HIS  
SAVINGS INTO A  
401-K PLAN...

MEANWHILE, THE FUN-LOVING BUT IRRESPONSIBLE GRASSHOPPER SPENT HIS MONEY ON PARTIES, FAST CARS AND TRIPS TO EXOTIC LOCALES...



IN OTHER WORDS, THE ANT AND THE GRASSHOPPER WERE IN PRETTY MUCH THE SAME FIX...

ANT TOILED ON  
AND HIS 401-K  
GOT BIGGER  
AND BIGGER.  
WHEN THE  
GRASSHOPPER  
SENT HIM  
POSTCARDS  
FROM HIS  
TRAVELS,  
THE ANT  
THOUGHT TO  
HIMSELF:



Grasshopper  
is so foolish!  
He'll have nothing  
stored up  
when winter  
comes!

WHEN WINTER  
DID COME, THE  
NASDAQ SANK,  
WALL STREET  
TANKED AND  
GREEDY CORPORATE  
OFFICERS BAILED  
OUT WITH MILLIONS  
WHILE LOYAL  
WORKERS LIKE  
THE ANT WERE  
LEFT WITH EMPTY  
RETIREMENT PLANS.

# **THERE ARE TWO RULES FOR SUCCESS:**

1. Never tell everything you know.

Roger H. Lincoln

