

The Scientific Paper

1

Scientific Writing

“The fundamental purpose of scientific discourse is not the mere presentation of information and thought, but rather its **actual communication**. It does not matter how pleased an author might be to have converted all the right data into sentences and paragraphs; it matters only whether a large majority of the reading audience accurately perceives what the author had in mind.”

Gopen and Swan (1990)

2

What was said and what was heard



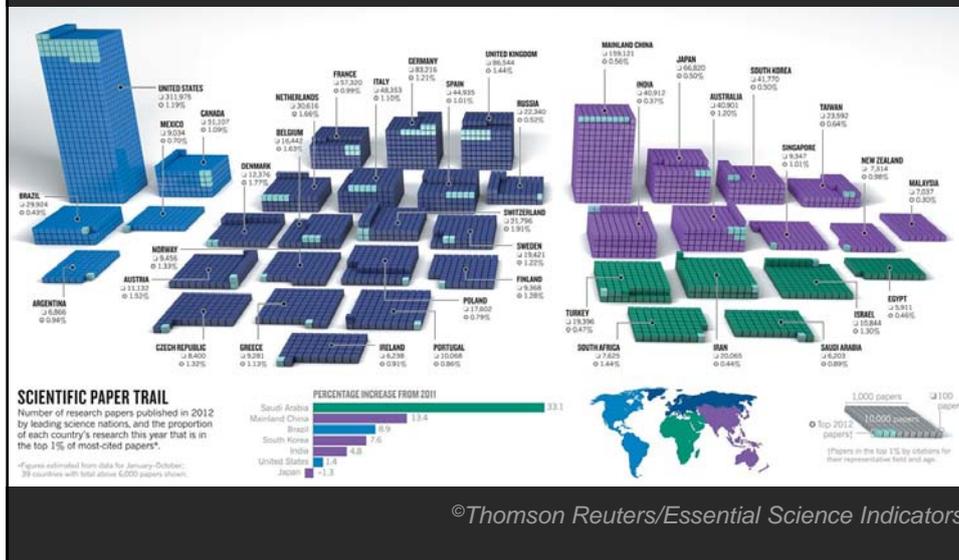
3

Scientific Writing

- Writing is an integral part of research
- Research is actualization of scientific thinking
End-point of that actualization: scientific papers

4

Paper output in 2012



So, what might be worth researching and publishing?

Hart, V.; Nováková, P.; Malkemper, E.P.; Begall, S.; Hanzal, V.; Jezek, M.; Kusta, T.; Nemcová, V.; Adámková, J.; Benediktová, K.; Cervený, J. and Burda, H. (2013)

Dogs are sensitive to small variations of the Earth's magnetic field

Frontiers in Zoology 10: 80

WoS citation count = 18 (up to May 2018)

- 70 dogs of 37 breeds
- 1,893 observations of defaecation and 5,582 observations of urination over a 2-year period

7

Finding

Dogs prefer to excrete with their bodies aligned along the North-South axis



8

Hucklenbroich, J.; Klein, R.; Neumaier, B.; Graf, R.; Fink, G.R.; Schroeter, M. and Rueger, M.A. (2014)

Aromatic-turmerone induces neural stem cell proliferation *in vitro* and *in vivo*

Stem Cell Research & Therapy 5: 100 – 109

WoS citation count = 17 (up to May 2018)

Tumerone shown to increase the regeneration of new neurons in cell cultures and in lab rats



9

Tolkamp, B.J.; Haskell, M.J.; Morgan, C.A. and Turner, S.P. (2010)

Are cows more likely to lie down the longer they stand?

Appl. Animal Behaviour Sci. 124: 1 – 10

WoS citation count = 28 (up to May 2018)

- No correlation between length of standing and lying down
- Correlation found between length of time lying and likelihood of standing up



10

Norris RD, Norris JM, Lorenz RD, Ray J, Jackson B (2014)
Sliding Rocks on Racetrack Playa, Death Valley National Park: First Observation of Rocks in Motion

PLoS ONE 9(8): e105948

WoS citation count = 8 (up to May 2018)



Boyle, G. (2008)

Pay Peanuts and Get Monkeys. Evidence from Academia

The B.E. Journal of Economic Analysis & Policy 8(1):

DOI: 10.2202/1935-1682.1976

“Research performance
is negatively related to
the value of outside
opportunities”

“Paying (relative) peanuts attracts mainly monkeys”



Better sex lives leads to longer life span

Research has shown that

- the sexually frustrated live shorter lives
- on the other hand, mating partially reverses (-)ve effects on health and aging



However, this evidence is based on a study of fruit flies

Gendron, C.M.; Kuo, T.H.; Harvanek, Z.M.; Chung, B.Y.; Yew, J.Y.; Dierick, H.A. and Pletcher, S.D. (2013)

Drosophila Life Span and Physiology Are Modulated by Sexual Perception and Reward

Science 343(6170): 544 – 548

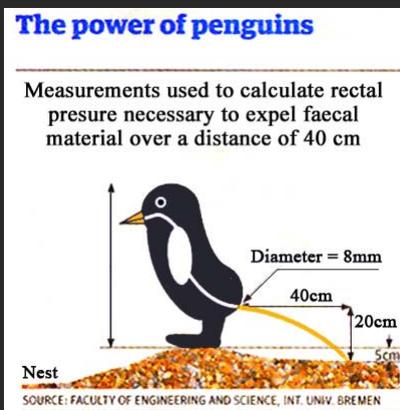
WoS citation count = 40 (up to May 2018)

Meyer-Rochow, V.B. and Gal, J. (2003)

Pressures produced when penguins pooh - calculations on avian defaecation

Polar Biology 27(1): 56 – 58

WoS citation count = 3 (up to May 2018)



“Whether a bird chooses the direction into which it decides to expel its faeces, and what role the wind plays in this, remain unknown.”

Roney, J.R.; Simmons, Z.L. and Lukaszewski, A.W. (2010)

Androgen receptor gene sequence and basal cortisol concentrations predict men's hormonal responses to potential mates

Proc. R. Soc. B 277: 57 – 63

WoS citation count = 32 (up to May 2018)

15

Or:

Talking to young women is beneficial for men



16

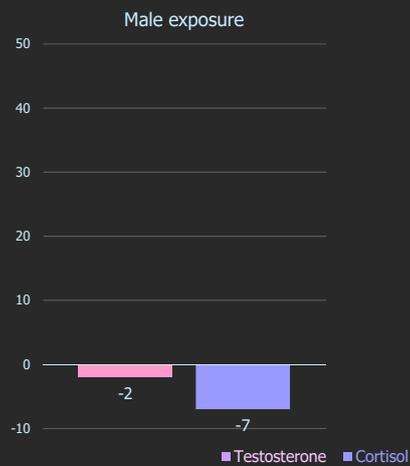
The experiment

- 149 men (ave. age 19)
- One group interacted with a male (aged 25)
- Another group interacted with 7 women (ave. age 19)
- **Testosterone** and **cortisol** levels measured

Associated with alertness; feeling of physical well-being; muscular endurance; is beneficial to cardiovascular health

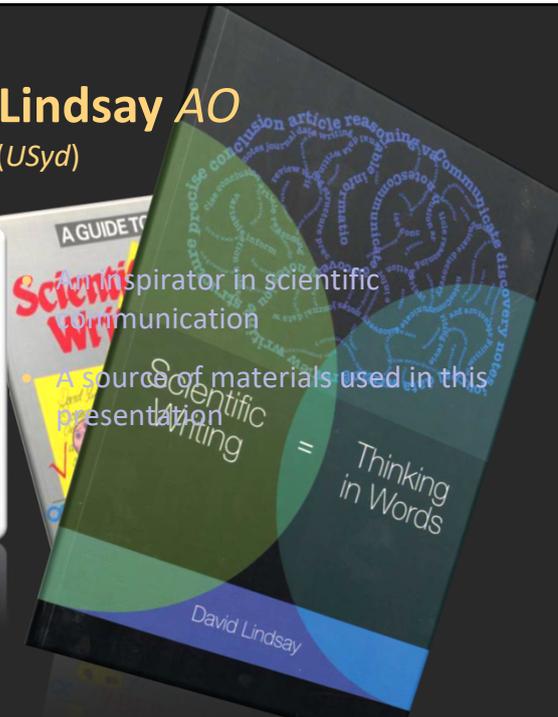
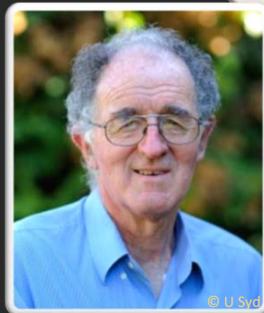
Helps reduce stress and anxiety
>> makes someone who is stressed out much happier

After 5 minutes of conversation



Prof. David Lindsay AO

BScAgr(Hons); PhD (USyd)



- An inspirator in scientific communication
- A source of materials used in this presentation

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The Title

Appl Microbiol Biotechnol (1996) 45:319-326

ORIGINAL PAPER

C. Kuek

Shake flask culture of *Laccaria laccata*, an ectomycorrhizal basidiomycete

Received: 9 October 1995/ Accepted: 4 December 1995

Abstract Large-scale exploitation of the potential benefits of ectomycorrhizal fungi in improving plantation yields means that fermentation techniques for these fungi will be required. Starting with a base performance on a rich, complex medium, the effect of variations in some physicochemical culture parameters on biomass yield was studied. It was possible to reduce the amount of phosphate salts (to 1/9th) and other ingredients (to 1/3rd) in the medium. A shaking speed of either 100 or 200 r.p.m. in an orbital incubator was satisfactory and biomass yield responded to an increase

eucalypt hardwoods to supply from plantations (Cameron and Penna 1988). Thus, there have been numerous studies on the manipulation of the ectomycorrhizal symbiosis in eucalypts in order to extract an advantage in plantation economics (Grove and Malajczuk 1994; Garbaye *et al.* 1988; Bougher *et al.* 1987; Abouelkhair *et al.* 1986). It is now clear that for many plantation tree species, inoculation at the seedling stage with an appropriate ectomycorrhizal fungus results in faster tree growth.

Apart from quantitative studies on the enhancement

Based on materials from Lindsay (1995) and Wilkinson, (1991)

The Title of a paper

- The link between the reader and the writer
- Identifies and describes the contents of a paper accurately, specifically and succinctly

Informative style

"Laksa taken in the morning causes lethargy in public servants"

Indicative style

"The effect of laksa taken in the morning on lethargy in public servants"

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The sections

- Introduction
- Materials and Methods
- Results
- Discussion of Results
- Summary or abstract

IMRaD

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What goes in each section?

The Bradford Hill Questions

- | | |
|-------------------------|----------------------------------|
| • Introduction | Why did they start? |
| • Materials & Methods | What did they do? |
| • Results | What did they find? |
| • Discussion of Results | What do the results mean? |

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The Introduction

Introduction

Ectomycorrhizal fungi form structures called ectomycorrhiza on the roots of many economically important trees such as pine, spruce, beech and eucalypts (Ruehle and Marx 1979; Warcup 1980). Ectomycorrhiza can increase the growth of host plants by increasing their uptake of nutrients from the soil (Harley and Smith 1983). Ectomycorrhizal fungi are important for the growth and survival of eucalypts (Bowen 1973; Malajczuk *et al.* 1975; Warcup, 1980). The eucalypt is an important plantation tree genus with over 7 million hectares planted world-wide (Cameron and Penna 1988). In Australia, a detailed study has advocated a change from reliance on native forests for

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al. 1988; Gagnon *et al.* 1988), and encapsulated pre-grown mycelium (Le Tacon *et al.* 1985; Mauperin *et al.* 1987; Deacon and Fox 1988). Deficiencies in the efficacy, physical form and manufacturing processes for the inocula forms currently available are revealed when they are assessed using criteria for efficacious and practical inocula which have been proposed (Tommerup *et al.* 1987). The use of fermentation techniques will enable inocula of higher quality to be produced.

Inocula produced by the submerged aerobic culture of mycelia immobilized within hydrogel beads has been found to be of high efficacy (Kuek *et al.* 1992). The production process for hydrogel bead inocula requires the ability to culture mycelium in both free and immobilized states. This is because free mycelium is used as a source of propagules for the production of mycelia immobilized in the hydrogel. Thus, the development of cultural conditions for ectomycorrhizal fungi in submerged aerobic culture is a necessary step towards the production of hydrogel bead inocula. Nutritional studies on the culture of ectomycorrhizal fungi (*e.g.* Ahmad *et al.* 1990; Ohta 1990) provide important information in one of two areas required for

The Introduction

Usually includes at least the following:

- Derivation and statement of the **problem** and discussion of the nature of the problem
- Discussion of the **background** of the problem
- Derivation and statement of the research **question** or objective(s) of the research

Structuring the introduction

- Problem >> Background >> Question >> Objective
- Background >> Problem >> Question >> Objective
- Question >> Objective >> Problem >> Background

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Search of the literature



- To avoid repetition of research
- The problem and its relation to earlier research
- Development of hypotheses
- To avoid misinterpretation of results
- To avoid omission of pertinent references

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Materials and Methods

their successful mass culture. The other area is that of basic fermentation data such as time-parameter profiles for key indicators such as biomass, residual carbon, and pH. Fermentation techniques have been discussed (Harvey *et al.* 1988; Harvey 1991), and assorted data from the submerged aerobic culture of various fungi are available (Litchfield and Arthur 1983; Le Tacon *et al.* 1985; Sasek 1989; Pradella *et al.* 1990). On the other hand, some papers refer to mycelial production via fermentation techniques but provide little or no information on either yield or methodology (e.g. Kropacek *et al.* 1989). A good fermentation is one where all the major substrates are consumed; there is efficient conversion of substrate to product, and a high yield is obtained in the minimum time. Thus, the attainment of a good fermentation can be determined by how much substrates are provided in relation to actual requirement and by the conditions of the fermentation. When a fungus is liquid cultured for the first time, it is common to provide a medium which is more than adequate in substrate composition and quantity. Similarly, the physical conditions such as agitation and aeration are set high so that they are not a limiting factor. Given such a start, the probability of success with the first culture of the fungus is enhanced. However, in industrial microbiology, success in culture often also means the

Materials and methods

Fungus

The culture used was *Laccaria laccata* (Scop. ex Fr.) Berk. & Br. E439 from the culture collection of the Commonwealth Scientific and Industrial Research Organisation's Division of Forestry, Perth, W. Australia. In plate culture, the solid medium used was modified Melin-Norkrans agar (Marx 1969) and incubation was at 25°C.

Growth medium

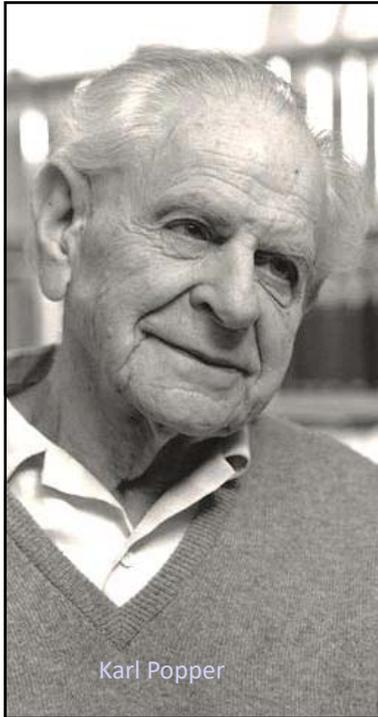
The initial medium used in shake flask culture was the same as one previously used for ectomycorrhizal fungi (Litchfield and Arthur 1983) except for the amount of glucose used. It comprised (g l⁻¹), peptone (Difco), 10.0; yeast extract (Difco), 2.0; NH₄NO₃, 3.0; KH₂PO₄, 2.38; K₂HPO₄, 5.65; MgSO₄·7H₂O, 1.0; CuSO₄·5H₂O, 0.0064; FeSO₄·7H₂O, 0.0011; MnCl₄H₂O, 0.0019; ZnSO₄·7H₂O, 0.0015. Glucose at desired concentrations was added prior to autoclaving. Variations of this formulation were tested as indicated in Table 1. In the case of the phosphate salts, reductions where mentioned, were made equally of both.

Sterilization

Media and apparatus were autoclaved at 121°C for 15 min.

Production of inoculum for shake flask culture proper

Remember falsifiability?



Karl Popper

Falsifiability

A scientific theory or hypothesis has the important characteristic that it is capable of being subject to experimentation that could show it to be untrue *i.e.* it is falsifiable

What does this imply for the reporting in Materials & Methods?

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Materials and Methods

A clear and accurate description of materials and methods is required to interpret, explain and give meaning to the results

Accurate description is required so that others can:

- replicate the experiments
- modify the method with assurance that the original is changed in a particular way
- Apply them under different conditions
- compare the research reported with others

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For example: What *Nature* says

authors & referees

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Availability of data and materials

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Supporting data must be made available to editors and peer-reviewers at the time of submission for the purposes of evaluating the manuscript. **Peer-reviewers** may be asked to comment on the terms of access to materials, methods and/or data sets; *Nature* journals reserve the right to **refuse publication** in cases where authors do not provide adequate assurances that they can comply with the journal's requirements for sharing materials.

After publication, readers who encounter refusal by the authors to comply with these policies should contact the chief editor of the journal (or the chief biology/chief physical sciences editors in the case of *Nature*). In cases where editors are unable to resolve a complaint, the journal may refer the matter to the authors' funding institution and/or publish a formal statement of objection, attached online to the publication, stating that

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"An inherent principle of publication is that others should be able to replicate and build upon authors' published claims."

Guide to authors and referees (Nature, 2012)

Procedural *versus* chronological order

Chronological Order

1. Injection of drug
2. Collection of blood sample
3. Analysis or storage of blood sample
4. Injection of drug
5. Analysis or storage of blood samples
6. Injection of drug
7. Collection of blood sample
8. Analysis or storage of blood sample
9. Killing of rats
10. Removal and fixation of liver tissue
11. Preparation of liver for histological study
12. Analysis of stored blood samples
13. Biochemical assays of tissue

Procedural Order

1. Protocol and method for injection of drug
2. Serum studies
 - a. Collection and storage of blood samples
 - b. Analysis of blood samples
3. Tissue studies
 - a. Killing of rats
 - b. Removal and fixation of liver
 - c. Biochemical assays
 - d. Histological preparation of liver tissue

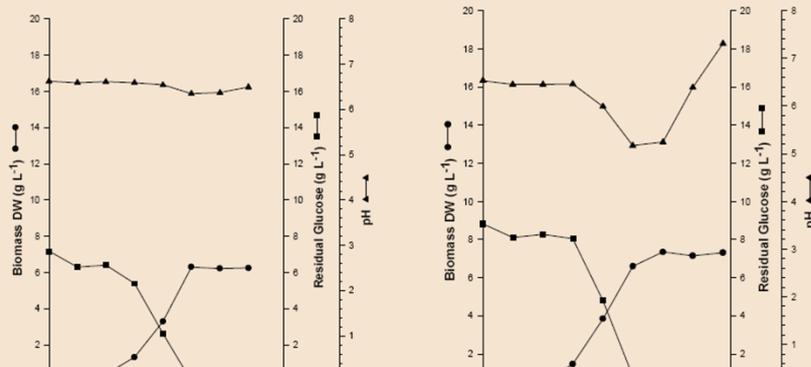
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Results

Results

The cultures were characterized by the measurement of residual glucose, biomass yield and pH through the course of the fermentation. The initial medium formulation used proved

(Fig. 3). At the lower shaking speed, when the amount of glucose supplied was doubled to 20 g L^{-1} , again the shape of the glucose consumption and biomass accumulation profiles were not significantly altered (Fig. 4). However, the final yield of biomass was increased by about 1.7



Avoid ending up publishing in this journal



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Results

The results of research are the substance of science and are the objective of scientific research

In reporting results:

- the overriding objective should be accuracy
- information should be systematically presented

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Structure and contents

- The results section must ultimately address
 - the **questions** raised in the introduction and
 - any **hypotheses** formulated there
- Since this section is a direct **consequence** of the methods,
organize it to **correspond** to the methods section

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The results section should not be:

- **merely a collection of tables and figures**
 - They can be part of, and support the development of the argument but must not replace it
 - They must be integrated into the text and done so via more than an announcement
- **used to interpret the results**
 - The results should consist of bare, dry, unembellished observations and measurements

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Discussion

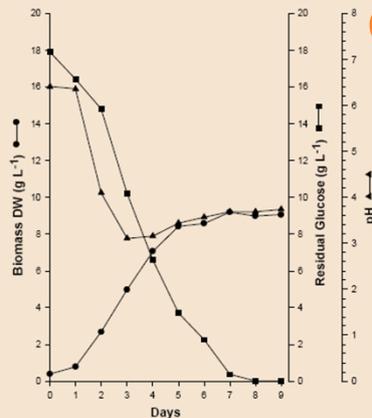


Fig. 10. Run 8. A repeat of Run 4 with the concentration of non-phosphate nutrients in the medium reduced to 1/6th of the original. Other conditions: 1/9th PO₄ salts; glucose 20 g l⁻¹; shaking speed 100 rpm; temperature 25°C.

Discussion

The initial medium used proved satisfactory for the shake flask culture of *Laccaria laccata*. The complete consumption of glucose must have meant that the other medium substrates were adequate in composition and quantity. The buffering capacity of the medium was proved to be good by later data which showed pH swings in contrast to the stability found in the first run. The first manipulation made in the culture conditions was the reduction in the concentration of added phosphate. This was desired because of the requirement in later work to culture the fungi as immobilized mycelia in calcium alginate. The presence of high concentrations of phosphates can dissolve calcium alginate and is thus a situation to avoid. Further, other studies have found that the formation of ectomycorrhiza and their functioning are diminished at high concentrations of soil phosphate (Beckford *et al.* 1985; Shaw *et al.* 1987; Bougher *et al.* 1990). Therefore, ectomycorrhizal fungi should be cultured at the lowest possible concentration of phosphate so that they are well adapted to the lower soil phosphate concentrations that will apply in the use of mycorrhizal technology. The lowering of amount of phosphate salts to 1/9th the original was made on the basis of a previous study where that amount of

Discussion

Whilst the results are the substance of science, the discussion allows for the play of ideas that advance science

The nature of discussion

1. The objective is to give the research, especially the results, meaning
2. Integration of the results, the method, the related literature, and theoretical context

3. Examination of the results to

- determine whether they **resolve** the research question
- **compare** them within themselves and to other results
- **explain** and interpret them
- draw **conclusions** or derive **generalizations**, and make **recommendations** for applying the new results or further research.

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**A note about giving explanation
(informed speculation?)
to results in discussion**

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Occam's Razor

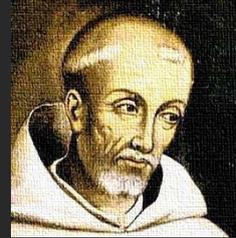
Oc·cam's razor

Variant(s): also Ock·ham's razor \ä-kəmz-\

Function: *noun*

Etymology: William of Occam

Date: circa 1837



“A scientific and philosophic rule that entities should not be multiplied unnecessarily.”

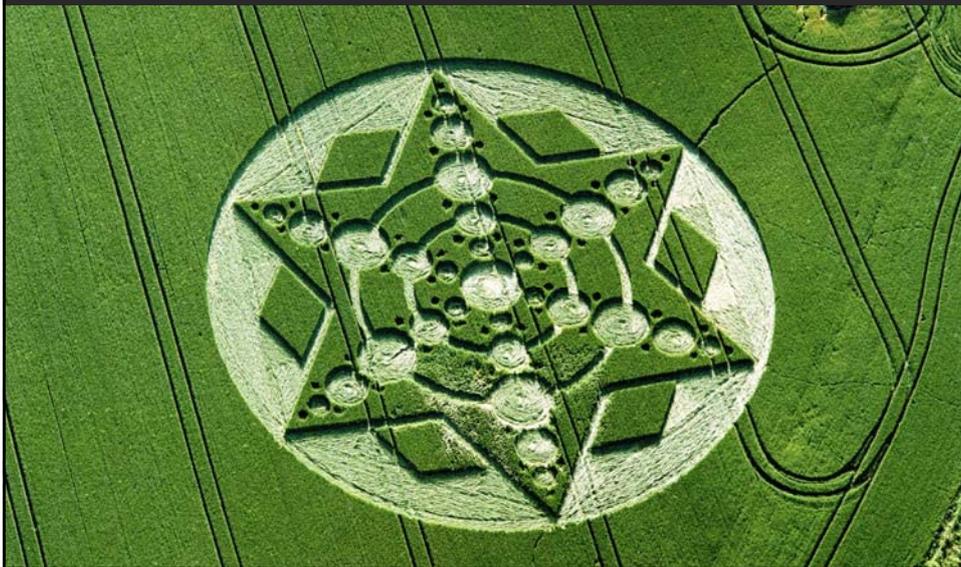
Interpretation:

“that explanations of unknown phenomena be sought first in terms of known quantities, or requiring that the **simplest** of competing theories be **preferred** to the more complex.”

Merriam-Webster dictionary

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Example: Who/what makes crop circles?



Competing Explanations 1

Extra-terrestrials do it



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Competing Explanations 2

More earthly and mundane causes



Sept 1991; *Today* newspaper

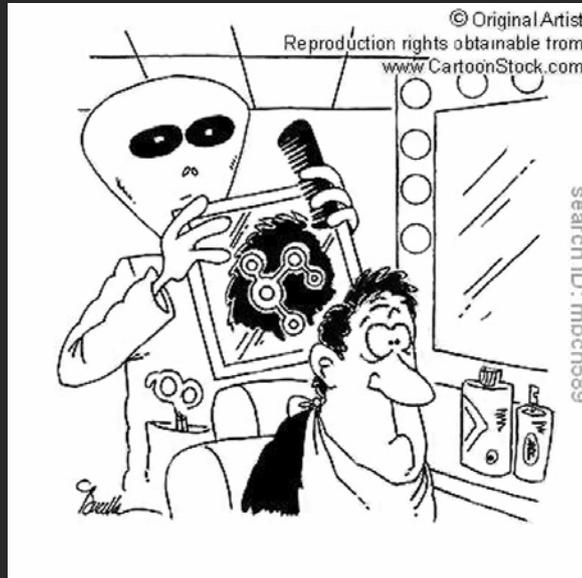
50

Competing Explanations 2

More earthly and mundane causes

The screenshot shows a BBC News article from June 25, 2009. The headline is "'Stoned wallabies make crop circles'". The article reports that Australian wallabies are eating opium poppies and creating crop circles in poppy fields. A quote from Lara Giddings, a government official, states: "We have a problem with wallabies entering poppy fields, getting as high as a kite and going around in circles. Then they crash". The article also includes a photo of a wallaby and a quote from a spokesman for poppy producer Tasmanian Alkaloids: "There have been many stories about sheep that have eaten some of the poppies after harvesting and they all walk around in circles," he added.

Which is the simpler explanation that is in keeping with Occam's Razor?



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The hourglass analogy of the research paper

Introduction

Materials & Methods

Results

Discussion



General context

Theoretical context

Empirical context

Specific hypothesis

Procedures

Analyses

Results

How results fit hypotheses

Empirical context of results

Theoretical context of results

General context of results

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Summary or Abstract

Appl Microbiol Biotechnol (1996) 45:319-326

ORIGINAL PAPER

C. Kuek

Shake flask culture of *Laccaria laccata*, an ectomycorrhizal basidiomycete

Received: 9 October 1995/ Accepted: 4 December 1995

Abstract Large-scale exploitation of the potential benefits of ectomycorrhizal fungi in improving plantation yields means that fermentation techniques for these fungi will be required. Starting with a base performance on a rich, complex medium, the effect of variations in some physicochemical culture parameters on biomass yield was studied. It was possible to reduce the amount of phosphate salts (to 1/9th) and other ingredients (to 1/3rd) in the medium. A shaking speed of either 100 or 200 r.p.m. in an orbital incubator was satisfactory and biomass yield responded to an increase in carbon substrate (glucose, from 10 and 20 g l⁻¹) though $I_{X/S}$ declined. An increase in inoculum size

eucalypt hardwoods to supply from plantations (Cameron and Penna 1988). Thus, there have been numerous studies on the manipulation of the ectomycorrhizal symbiosis in eucalypts in order to extract an advantage in plantation economics (Grove and Malajczuk 1994; Garbaye *et al.* 1988; Bougher *et al.* 1987; Abouelkhair *et al.* 1986). It is now clear that for many plantation tree species, inoculation at the seedling stage with an appropriate ectomycorrhizal fungus results in faster tree growth.

Apart from quantitative studies on the enhancement of tree growth attainable with ectomycorrhizal fungi, appropriate technology for the mass culture of the fungi

Summary /Abstract

Often written last but of great importance

- Can decide if the paper gets read
- Gathered by database and abstracting services which are important disseminators of your work

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Shake flask culture of *Laccaria laccata*, an ectomycorrhizal basidiomycete

By: [Kuek, C](#), [Kuek, C](#)
View ResearchID and ORCID

APPLIED MICROBIOLOGY AND BIOTECHNOLOGY
Volume: 45 Issue: 3 Pages: 319-326
Published: APR 1996
View Journal Information

Abstract
Large-scale exploitation of the potential benefits of ectomycorrhizal fungi in improving plantation yields means that fermentation techniques for these fungi will be required. Starting with a base performance on a rich, complex medium, the effect of variations in some physicochemical culture parameters on biomass yield was studied. It was possible to reduce the amount of phosphate salts (to 1/9th) and other ingredients (to 1/3rd) in the medium. A shaking speed of either 100 rpm or 200 rpm in an orbital incubator was satisfactory and biomass yield responded to an increase in carbon substrate (glucose, from 10 g l⁻¹ and 20 g l⁻¹) though Y-x/s declined. An increase in inoculum size shortened culture time but decreased biomass yield. The upper limit of the incubation temperature was between 25 degrees C and 30 degrees C. Biomass yields were about 12 g l⁻¹ dry weight (Y-x/s = 0.63) when 20 g l⁻¹ glucose was supplied, and about 7 g l⁻¹ (Y-x/s = 0.74) when 10 g l⁻¹ glucose was supplied.

Keywords
KeyWords Plus: CALCIUM ALGINATE BEADS; PISOLITHUS-TINCTORIUS; ASPERGILLUS-PHOENICUS; SEEDLINGS; NITROGEN; GROWTH

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Publisher
SPRINGER VERLAG, 175 FIFTH AVE, NEW YORK, NY 10010

Categories / Classification
Research Areas: Biotechnology & Applied Microbiology
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Elements of an effective summary

Broad outline of:

- Why the experiment was done
- How the experiment was done
- The main results
- Main conclusions

Should be written as a self-supporting section

Acknowledgments

Always acknowledge

- Funding support
(grants; scholarships; study leave)
- Services rendered by people other than the authors
(material and statistical analyses)
- Other matters as appropriate

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Consider:

Brown, C.M. and Henderson, D.M. (2015)
A New Horned Dinosaur Reveals Convergent
Evolution in Cranial Ornamentation in
Ceratopsidae. *Current Biology* 25: 1641 - 1648



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Harvard system

Parenthetical referencing embedded in the text.

e.g.

The moon is made of Wensleydale cheese (Wallace and Gromit, 1989)

Reference

Wallace and Gromit (1989) "A Grand Day Out."
UK: Ardman Productions



Vancouver system

Arabic numerals in parentheses (1), square brackets [1], superscript¹, or a combination^[1]

e.g.

The moon is made of Wensleydale cheese¹

Reference

1. Wallace and Gromit (1989) "A Grand Day Out." UK: Ardman Productions

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Citations

Citations serve to :

- Provide authority for views made or positions taken, or statement cited
- Allow for checking of the accuracy of the citation made
- Allow further/other information to be sourced regarding the citation (additional references)
- Acknowledge conflicts with other works
- Acknowledge/credit the originator of cited works

After Lindsay, 1995; and Posner, 2007

It is about being **intellectually honest**

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Some examples of the serious consequences of failure to acknowledge



2002

Vice Chancellor,
Monash University resigned
(Citation problems in 3 of his books)



2011

Defense Minister,
Germany resigned
(citation problems in his PhD thesis)



2014

Asst. Professor,
Amherst College resigned
(widespread plagiarism dating
back to doctorate)

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“My reason for resigning is simple. In certain sections of my scholarly work, I unintentionally failed to cite and improperly cited previously published materials. In the realm of academic scholarship, such mistakes are very serious in nature.”

Carleen Basler

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The serious consequences of failure to acknowledge

The screenshot shows a web browser displaying a New York Times article. The article title is "How Senator John Walsh Plagiarized a Final Paper". Below the title, there is an interactive visualization consisting of a horizontal bar chart with 18 numbered segments. A legend indicates that red segments represent "Passages taken without attribution" and yellow segments represent "Passages with improper attribution, including using other authors' language without quotations". The article text is partially visible, showing a section titled "Identical Beginnings" which discusses the Bush administration's focus on promoting democracy. The browser's address bar shows the URL: "nytimes.com/interactive/2014/07/23/us/politics/john-walsh-final-paper-plagiarism.html?_r=2".

The serious consequences of failure to acknowledge

Identical Beginnings
The first sentence of Mr. Walsh's thesis is almost identical to that of a 2003 Foreign Affairs article by Thomas Carothers, "Promoting Democracy And Fighting Terror." Throughout the paper Mr. Walsh cites the work of other authors in footnotes, but uses their exact – or almost exact – language without quotation marks.

THE CASE FOR DEMOCRACY AS A LONG TERM NATIONAL STRATEGY

When George W. Bush took office in January 2001, few expected that promoting democracy around the world would become a major issue in his presidency.¹ During 2001, the Bush administration did not even address the issue of promoting civil societies, rule of law, free elections and open political processes as major issues of their agenda.² During the 2000 presidential campaign Bush and his advisors made it clear that they favored great power realism over idealistic notions such as nation building or democracy promotion.³ Four years later President Bush used his second inaugural speech to define an expansive new mission for American foreign policy based on promoting freedom around the world, it was clear that the president's interests in democracy was more than a passing fancy.⁴

The policies championed on January 20, 2005, have become known as the Bush Doctrine. However, the idea that the advance of democracy beyond one's shores is vital to the security enjoyed within them is not new.⁵ In his inaugural address on January 20, President George W. Bush declared that "it is the policy of the United States to seek and support the growth of democratic movements and institutions in every nation and culture, with the ultimate goal of ending tyranny in our world."⁶

As long as the Middle East remains a place where freedom does not flourish, it will remain a place of stagnation, resentment, and violence ready for export. And with the spread of weapons that can bring catastrophic harm to our country and to our friends, it would be reckless to accept the status quo. Therefore the United States has adopted a new policy, a forward strategy of freedom in the Middle East.⁷

There are obstacles remaining on the road to democracy in the Middle East, especially in Iraq where American efforts to help Iraqis build a free society have suffered numerous setbacks and have met considerable opposition.⁸

Those who believe that a democratic Middle East is possible are few in number. Within certain sectors of America, and nearly everywhere outside of America, the voices of skepticism are growing. Many have questioned whether the democratic world has a right to impose its values on a region that is said to reject them. Many have argued that military intervention in the Middle East is causing more harm than good.⁹

They also argue that there are certain cultures and civilizations that are not compatible with democracy and certain peoples who do not deserve it.¹⁰

There is not a single non-democratic regime in the Middle East, nor anywhere else for that matter, that wants Iraqis to be free. The regimes that deny freedoms to Iranians, Syrians, Saudi Arabians, Egyptians, and so many others know that

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success in Iraq indicates that the sands in the hourglass that mark their repressive rule will start running out faster than ever.¹¹

This project will provide a valid argument that the United States must continue to pursue democracy in the Middle East as a key component of the National Security Strategy of the United States of America beyond January 20, 2009 when President Bush leaves office.

Democracy is not an unalloyed good and the United States should not blindly attempt to spread democracy to the exclusion of all other goals, but the belief is that U.S. and global interests would be advanced if the world contained more democracies. If the Bush doctrine is successful in laying the foundation for democracy in the region and elsewhere around the world, the spread of democracy in the Middle East will have to remain American policy beyond January 20, 2009.¹² Patience is a must and if we have any hope of successfully promoting freedom as the alternative to tyranny and despair we must remain patient!

Defining Democracy

As the United States pursues democracy around the globe, it is important to understand the definition and concept of democracy. There are deep disagreements about the appropriate theoretical framework, about whether democracy is simply an institutional arrangement for choosing rulers or an end in itself, about how to measure and evaluate democracy, and about the importance of prerequisites for democracy.¹³ Democracy seems especially difficult to define because it is not a given or a thing in itself but rather a form of government and a process of governance that changes and adapts in response to circumstances.¹⁴

There is one widely recognized definition of democracy that is accepted not only in much of the Western World but also in much of the Third World.¹⁵ This pure definition of democracy as defined by the United States State Department is, "government by the people in whom the supreme power is vested in the people and exercised directly by them, or by their elected agents, under a free electoral system."¹⁶ The most common form of democracy today is a representative democracy that allows the people to elect their representatives to make decisions for the people, develop laws, and oversee the governmental programs developed for the population.¹⁷

We live in a time when the call for freedom and democracy echoes across the globe. Eastern Europe has cast off the totalitarian governments of almost half a century, and the republics of the former Soviet Union are struggling to replace the Communist regime of almost 75 years with a new democratic order, something they could never before experience. North and South America is now virtually a hemisphere of democracy. Africa is experiencing an

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The screenshot shows a web browser window with a URL bar containing "nytimes.com". The page title is "POLITICS | How Senator John Walsh Plagiarized a Final Paper". The main content of the page is a text block with several paragraphs. A callout box on the left side of the page reads: "An Entire Page Mr. Walsh uses more than 500 words from a Harvard paper including the author's original footnotes without attribution to the paper or crediting the author." The text in the main content is highlighted in red, indicating plagiarism. The text includes phrases like "democracy in the Middle East is therefore not merely consistent with U.S. security goals; it is necessary to achieve them", "Many studies have found that there are virtually no historical cases of democracies going to war with one another", "Most studies of the democratic-peace proposition have argued that democracies only enjoy a state of peace with other democracies", and "Spreading democracy is likely to enhance U.S. national security because democracies".

What is the relationship between failure to cite adequately and plagiarism?

Plagiarism



"Plagiarism means presenting the work or property of another person as one's own without appropriate acknowledgment or referencing" (Curtin University)

Plagiarize



"... to steal and pass off (*the ideas or words of another*) as one's own; use (*another's production*) without crediting the source" (Merriam-Webster Dictionary)

Consequence

BIOMASS AND BIOENERGY 35 (2011) 3284

Available at www.sciencedirect.com

ScienceDirect

<http://www.elsevier.com/locate/biombioe>



Retraction notice to “A Review of Biodiesel Production Processes” [Biomass Bioenergy 35 (2011) 1008–1020]

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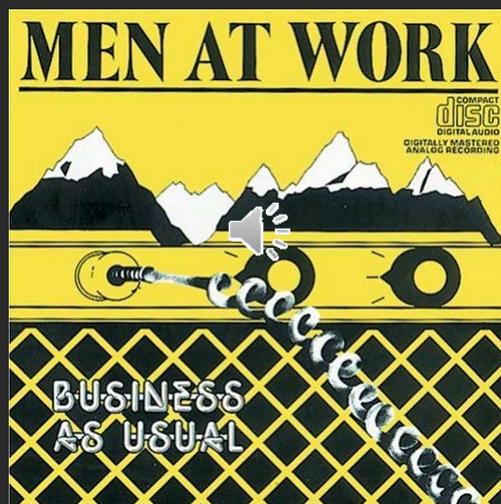
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This article has been retracted: please see Elsevier Policy on Article Withdrawal (<http://www.elsevier.com/locate/withdrawalpolicy>).
This article has been retracted at the request of the Editors and authors as the authors have plagiarized parts of a paper that had already appeared in Fuel 89 (2010) 1–9. doi:10.1016/j.fuel.2009.08.014.

One of the conditions of submission of a paper for publication is that authors declare explicitly that their work is original and has not appeared in a publication elsewhere. Re-use of any data should be appropriately cited. As such this article represents a severe abuse of the scientific publishing system. The scientific community takes a very strong view on this matter and apologies are offered to readers of the journal that this was not detected during the submission process.

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A musical example



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A musical example



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Forms of citations



Information-prominent

"Red cars are the fastest (Bloggs, 1999)"

Author- prominent

"Bloggs (1999) claimed that red cars are the fastest"

One's position is given by choice of wording in the text

"Red cars are the fastest (Bloggs, 1976)"

Implication: Accepted concept; Bloggs first to present;
the author agrees

"Bloggs (1976) found that red cars are the fastest"

Implication: Concept deduced by Bloggs; the author agrees

"Bloggs (1976) claimed that red cars are the fastest"

Implication: The verdict is still out; the author is neutral.

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Word choices (after Monash, 2010)

When you agree with an author's conclusions:

Acknowledge; demonstrate; prove; identify.

e.g. Bloggs *acknowledges* that there may be other factors ...
Bloggs *demonstrates* this as an additional factor ...

When you disagree:

Confuses; disregards; ignores.

e.g. Bloggs *confuses* this factor with ...
Bloggs *disregards* this factor ...

When you feel the author is unsure/unclear; not being explicit:

Suggests; implies; intimates.

e.g. Bloggs *implies* that this factor is

Referring to the information without expressing an opinion:

Notes; proposes; believes.

e.g. Bloggs *believes* that this factor is ...
Bloggs *proposes* that this factor is ...

Being neutral

(demonstrating your knowledge without allowing judgment to intrude)

e.g. Further factors were described by Bloggs ...
Bloggs reported that...

When you convey the author's positive attitude:

Accept; emphasize; note; point out; subscribe to.

e.g. Bloggs accepts that these factors
Bloggs subscribes to the idea that

When you convey the author's negative attitude:

Attack; dismiss; dispute; oppose; question; reject.

e.g. Bloggs disputes the concept of
Bloggs questions the validity

Using evaluative expressions to indicate your own views of a citation (after Monash, 2010)

The work/study/paper . . .

. . . disregarded was limited to . . .
. . . neglected to consider overestimated . . .
. . . overlooked suffered from . . .
. . . took no account of . . .

Some evaluative adjectives

incomplete	too general	robust
efficient	reliable	inconclusive
questionable	cumbersome	unsatisfactory
useful	over-simplified	comprehensive
simple	complex	

A potential problem: Proper use/choice of sources



Consider this citation

Freshwater fish contain less n-3 fatty acids than marine fish (Kumar *et al.*, 2008).

Checking reveals the source as

Kumar, V.; Sahu, N.P.; Pal, A.K.; Kumar, S.; Sharma, P.; Chettri, J.K. and Sinha, A.K. (2009) Non-gelatized starch influences the deposition of n-3 fatty acids in the muscle of a tropical freshwater fish, *Labeo rohita*. J. Animal Physiol. Animal Nutrition 93: 659 – 668.

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Non-gelatized starch influences the deposition of n-3 fatty acids in the muscle of a tropical freshwater fish, *Labeo rohita*

Introduction

Present trend of increased health consciousness among the consumer has diverted the attention of animal nutritionist to the product quality improvement beside the growth of the animal. Hence more emphasis is being given for enhancing the n-3 fatty acids content of the animal product as a strategy for quality improvement. Some n-3 enriched products like egg, meat are already present in the market, whereas some other like fish and milk are in the pipeline.

Compared with marine fish, freshwater fish contain less n-3 fatty acids.

Though some molecular approach has been initiated to introduce desaturase gene into freshwater fishes (Zheng *et al.*, 2004) as a strategy to enhance the n-3 fatty acids content, no significant outcome has come yet. In this regard, dietary manipulation seems to be more practical than the gene manipulation approach. Hence the influence of muscle fatty acids because of dietary nutrients needs thorough understanding. Though the relationship between dietary fatty acids with fatty acids profile of muscle has already been established, its relation with other nutrients like carbohydrate has not been established especially in fish, which may be helpful to the nutritionist for their product quality improvement programme.

**Is it valid to cite this paper in the manner shown?
No, the paper has no substantiating data**

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The recording of data

Bell's lab notebook entry for 10 March 1876

March 10th 1876

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Fig. 1.

Transmitting Apparatus

Receiving Apparatus

1. The improved instrument shown in Fig. 1 was constructed this morning and tried this evening. P is a brass pipe and W the platinum wire. M the mouth piece and S the armature of the Receiving Instrument.

Mr. Watson was stationed in one room with the Receiving Instrument. He pressed one ear closely against S and closed his other ear with his hand. The Transmitting Instrument was placed in another room and the doors of both rooms were closed.

I then slanted into M the following sentence: "Mr. Watson come here - I want to see you"

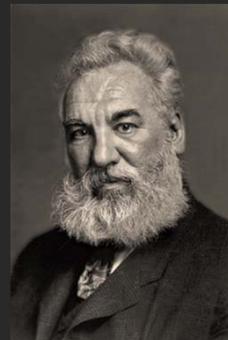
41

"see you" To my delight he came and declared that he had heard and understood what I said. I asked him to repeat the words - ~~He said~~ He answered "you said 'Mr. Watson - come here - I want to see you'." Mr. W then changed places and I listened at S while Mr. Watson read a few passages from a book into the mouth piece M. It was certainly the case that articulate sounds proceeded from S. The effect was loud but indistinct and muffled.

If I had read beforehand the passage given by Mr. Watson I should have recognized every word. As it was I could not make out the sense - but an occasional word here and there was quite distinct. I made out "to" and "out" and "further"; and finally the sentence "Mr. Bell Do you understand what I say? Do - you - un - der - stand - what - I - say" came quite clearly and intelligibly. No sound was audible when the armature S was removed.

The recording of data

Patent for the first practical telephone



Alexander Graham bell

The Lab Record Book

- Is a legal document recording your work
- Proof that you conducted the research
Disputes; plagiarism
- Required to prove right to own a related patent
“First to invent ”; “first to file ”

85

Required features

- Permanently bound pages
- Consecutive page numbering
- Entries in chronological order without blank pages;
written clearly
- Pre-experimental details (work/ideas) recorded
- Results obtained at a later stage recorded in date order
and cross cross-referenced to earlier entry
- Additional materials (*e.g.* photographs; printouts) are
attached with stapling or adhesive
- Record of equipment details (manufacturer; model);
indicate purpose if unclear

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Controversy over pagination



Controversy over pagination

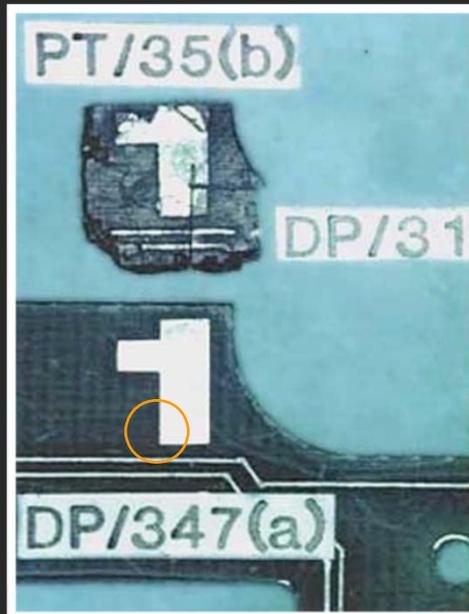
21 Dec 1988, Pan Am 103 ends flight at Lockerbie



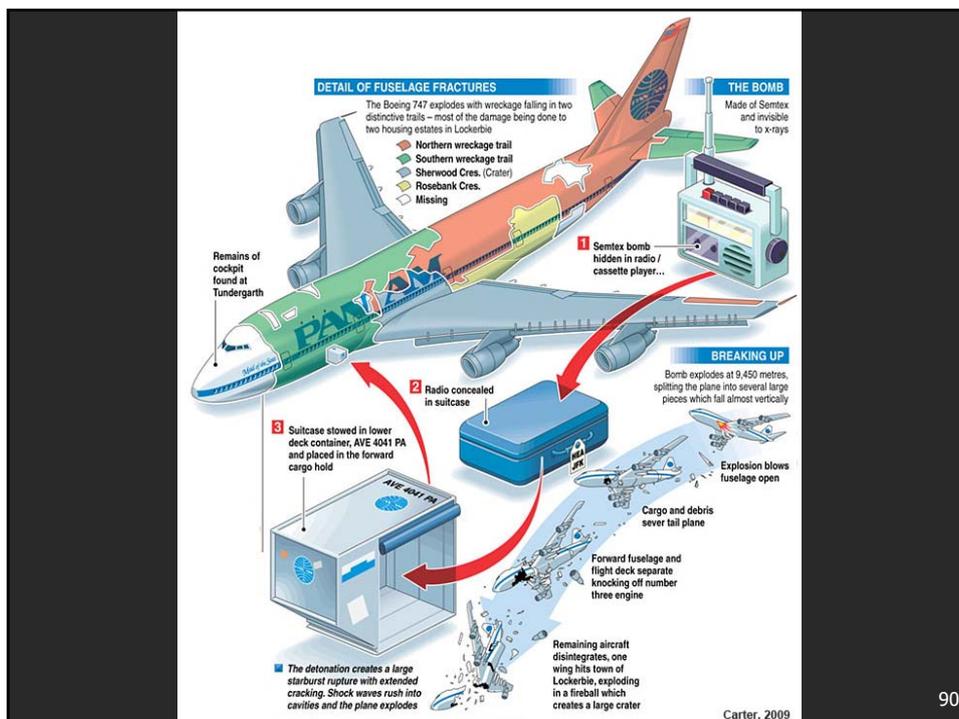
88

Critical evidence:

- Timer fragment found in the remnants of a shirt
- Shirt linked to a purchase from a shop in Malta
- Shop owner identified the suspect



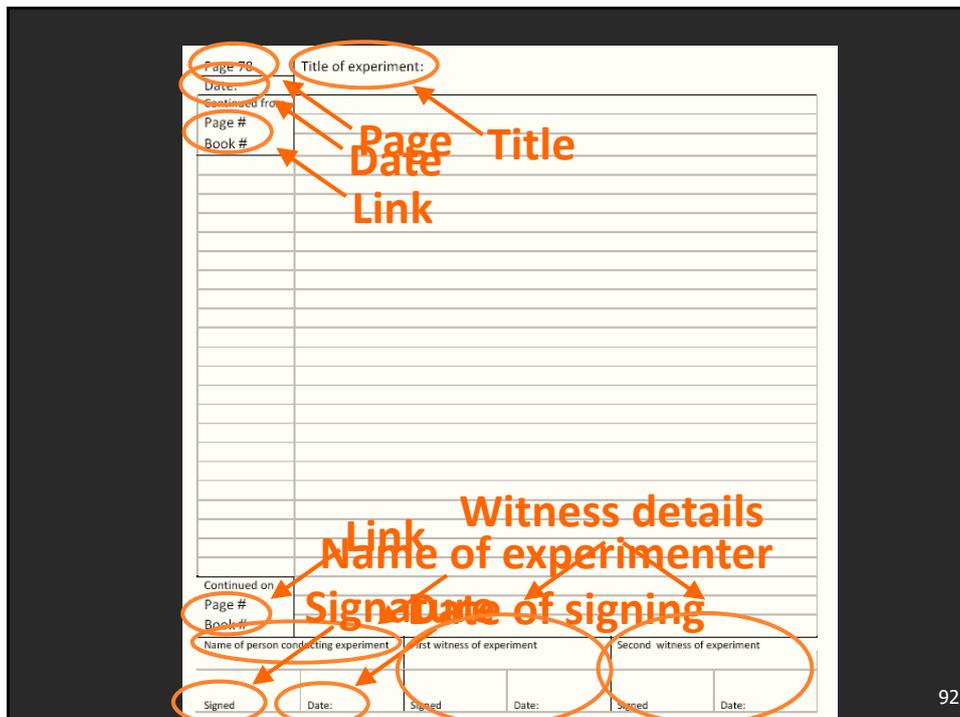
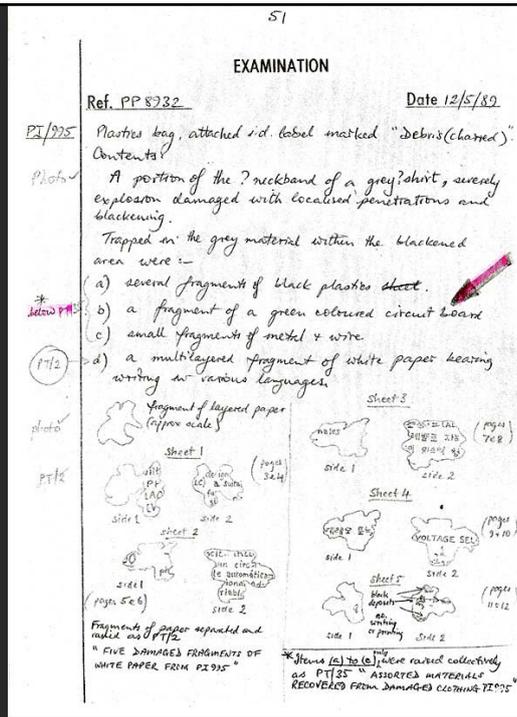
89



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Problem:

- Finding of timer fragment recorded by explosives expert, Dr Hayes
- The find was recorded in Hayes' note book on Page 51
- The subsequent pages were re-numbered from 51 -55 to 52 - 56
- Was Page 51 inserted after the fact?



- Sketches used to detail method or equipment setup
- All errors remain legible *e.g.* ruled out rather than erased or covered. Provide reason if unclear
- Alterations (additions; changes) signed and dated
- Each experiment/work period signed and dated by writer.

Higher level requirement

- Duplicate copy kept separately
- Witness (not a participant in the work) also to sign off

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- Do not fear “writing too much”
- It is a complete record – treat it like a diary
- How much detail?
Any knowledgeable person should be able to understand your procedures used to obtain your results
- The more details, the easier it will be to claim “first to invent”
- Requirements for patenting provide for a high standard which benefits the writing of scientific papers

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A cautionary tale

Who owns research data at your university?



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A cautionary tale

The Scientist
MAGAZINE OF THE LIFE SCIENCES

A Morpholino oligo can protect the mRNA target of an miRNA

Chronic Fatigue Researcher Arrested
Judy Mikovits, notorious in the scientific community since she claimed to link a mouse prionvirus to chronic fatigue syndrome, has been arrested and is being held in jail.

Dispute Over Lab Lands Researcher
Intellectual Property

Judy Mikovits, a biochemist who became world famous for her studies with chronic fatigue syndrome (CFS), was arrested and jailed on 18 November in Ventura, California, on a felony charge of possessing stolen property from a research institute in feed her in September. The property at issue includes laboratory notebooks...

In summation

Why is good writing important?

(Springer, 2013)

“Science is complex,
but the writing used to describe it need not be.

Good writing is simple writing.”

- Better chance of acceptance for publication
- Better impact of a manuscript
- Accelerates understanding and acceptance
- Increased faith in the quality of the work reported

“Poorly written and complicated manuscripts annoy readers, peer reviewers, and journal editors, and hinder their understanding of complicated scientific concepts.”

97

Sources

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