

TEACHING RESEARCH ETHICS TO BIOSCIENCE STUDENTS - INTRODUCTION

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INTRODUCTION: THE SOCIAL CONTEXT

- What is science?
- The nature of scientific knowledge
- Perceptions of/attitudes to science and scientists

Nature of Science

- Science - investigation of the natural world; based on human curiosity but has clear societal dimensions
- Science assumes that there is an objective reality to be discovered and seeks to approach that reality by observation, measurement and experiment

Nature of Science

- Difficult to put boundaries round research topics but what about methods?
- Technology - application of knowledge - much more value-laden than science itself
- Do we need to put boundaries round the use of knowledge?

EMPHASIS TODAY

- Not on applications of science ...



But on doing science ...



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THE SOCIAL CONTEXT

- Different views of the scientist
 - These views affect perceptions of the practice of science
- Science v. technology
 - Including the commodification of science
 - 'Modern research is a social phenomenon'
D.Resnik, 2004
- The social context: modernism and post-modernism

PANTENE proV

Enriched with a unique Amino proV complex

**Penetrates and helps replenish amino acids that
are naturally found in hair but are gradually
lost**

NE X US

NATURE AND EARTH UNITE WITH SCIENCE

KERApHIX

Restorative Protein Creme Reconstructor

Uses technically advanced

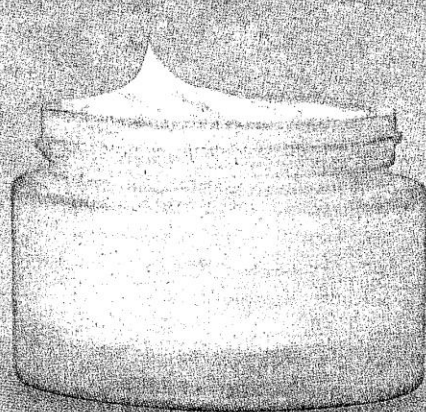
Nexxuspheres and strengthening keratin amino acids to restore health, elasticity and shine.

The Nexxuspheres ionically bond to damaged hair to deliver restorative lipids, vitamins and ceramides.

Time-released nucleic acids allow Keraphix to eliminate split ends, modify cuticle degradation and improve hair plasticity

G2

**Here comes the
dodgy science bit...**
How 'chemistry' sells face cream



ALSO

- To teach research ethics, we need to ensure that our students have some knowledge of more general ethics





David Sharp
Died, May 2006
300m below summit

Thanks to Dr Donal O'Mathuna for this example

SOME COMMENTS FROM OTHER CLIMBERS

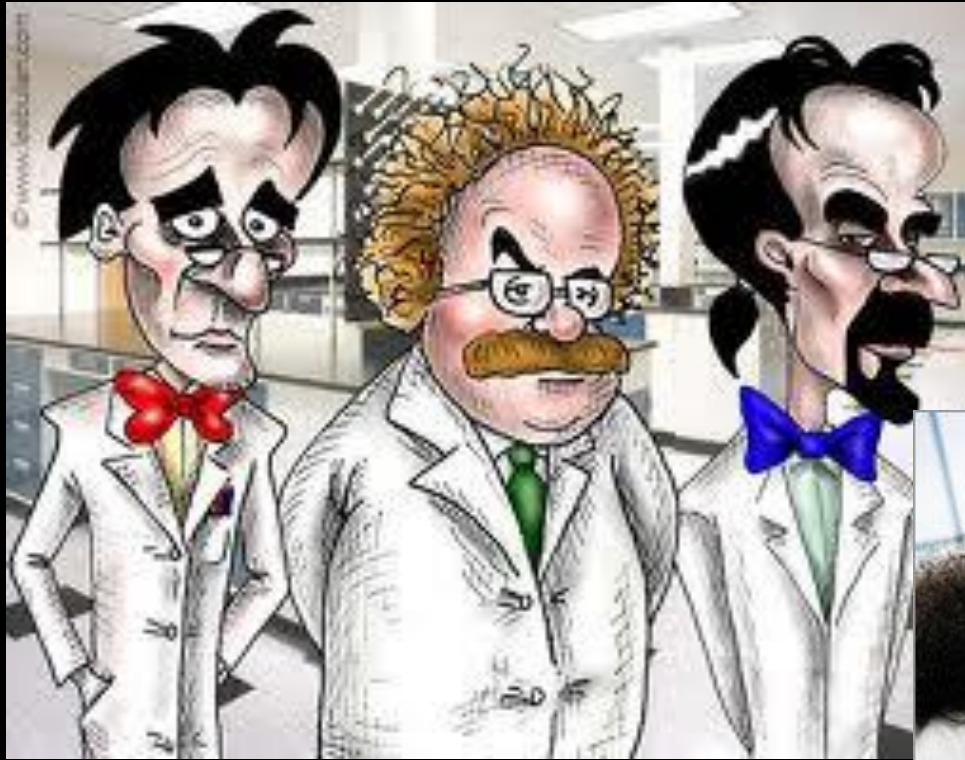
- Passing people who are dying is not uncommon. Unfortunately there are those who say 'It's not my problem. I've spent all this money and I'm going to the summit'
- He wasn't a member of our expedition
- Your responsibility is to save yourself, not to try to save others
- You know, he's been there x number of hours, been there without oxygen, you know he's effectively dead
- He's a human being and we would regard it as our duty to get him back to safety

Making moral choices

- Muddling through
- Deontological and rights-based systems (Kant)
- Consequentialist systems
- Virtue
- Natural Law

TO THINK ABOUT

- What is ethics for?
- To whom/what does ethics apply?
- Can science – its practice and applications – be subject to ethical analysis?



THE QUESTION IS ...

- Can we come up with a set of rules/guidelines/principles/virtues by which we can act in doing our science?
- The medical fraternity have managed to do so with their four virtues of medical ethics:
 - Doing good, Not doing harm, Autonomy & Justice

The 'norms' of science

- Universality
- Community
- Impartiality
- Open-mindedness

Paraphrasing R.K.Merton (1942)

- All these norms are challenged in the current social climate in which science is practised

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"They don't trust each other to share research."



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2006

Element 118 (2002)

- Data for the 2002 paper were fabricated
- However, existence of 118 has since been verified

1 H 1.0079	2 He 4.0026											13 Al 26.982	14 Si 28.086	15 P 30.974	16 S 32.065	17 Cl 35.453	18 Ar 39.948
3 Li 6.941	4 Be 9.0122											5 B 10.811	6 C 12.011	7 N 14.007	8 O 15.999	9 F 18.998	10 Ne 20.180
11 Na 22.990	12 Mg 24.305	3	4	5	6	7	8	9	10	11	12	13 Al 26.982	14 Si 28.086	15 P 30.974	16 S 32.065	17 Cl 35.453	18 Ar 39.948
19 K 39.098	20 Ca 40.078	21 Sc 44.956	22 Ti 47.867	23 V 50.942	24 Cr 51.996	25 Mn 54.938	26 Fe 55.845	27 Co 58.933	28 Ni 58.693	29 Cu 63.546	30 Zn 65.409	31 Ga 69.723	32 Ge 72.64	33 As 74.922	34 Se 78.96	35 Br 79.904	36 Kr 83.798
37 Rb 85.468	38 Sr 87.62	39 Y 88.906	40 Zr 91.224	41 Nb 92.906	42 Mo 95.94	43 Tc (98)	44 Ru 101.07	45 Rh 102.91	46 Pd 106.42	47 Ag 107.87	48 Cd 112.41	49 In 114.82	50 Sn 118.71	51 Sb 121.76	52 Te 127.60	53 I 126.90	54 Xe 131.29
55 Cs 132.91	56 Ba 137.33	57-71 *	72 Hf 178.49	73 Ta 180.95	74 W 183.84	75 Re 186.21	76 Os 190.23	77 Ir 192.22	78 Pt 195.08	79 Au 196.97	80 Hg 200.59	81 Tl 204.38	82 Pb 207.2	83 Bi 208.98	84 Po (209)	85 At (210)	86 Rn (222)
87 Fr (223)	88 Ra (226)	89-103 #	104 Rf (261)	105 Db (262)	106 Sg (266)	107 Bh (264)	108 Hs (277)	109 Mt (268)	110 Ds (281)	111 Rg (272)	112 Uub (285)	113 Uut (284)	114 Uuq (289)	115 Uup (288)	116 Uuh (291)		118 Uuo (294)

* Lanthanide series

57 La 138.91	58 Ce 140.12	59 Pr 140.91	60 Nd 144.24	61 Pm (145)	62 Sm 150.36	63 Eu 151.96	64 Gd 157.25	65 Tb 158.93	66 Dy 162.50	67 Ho 164.93	68 Er 167.26	69 Tm 168.93	70 Yb 173.04	71 Lu 174.97
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Actinide series

89 Ac (227)	90 Th 232.04	91 Pa 231.04	92 U 238.03	93 Np (237)	94 Pu (244)	95 Am (243)	96 Cm (247)	97 Bk (247)	98 Cf (251)	99 Es (252)	100 Fm (257)	101 Md (258)	102 No (259)	103 Lr (262)
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Thanks to Dr Donal O'Mathuna for this example

WHAT'S TO BE DONE?

- Codes of ethics (e.g Institute of Biology)
- Ethics benchmarks for scientists
- Research ethics committees
- Ethics training
- We are all tempted ...

CASE STUDY

- A final-year PhD student who has handed in her thesis is soon to have her *viva* (before starting a post-doc job) discovers through chatting at national conference that her research has been 'tapped' by a commercial company. After talking to her supervisor she learns that he has been discussing patents and working up a contract with the company. He tells the student that these developments will occur in the future and that she therefore will have no interest or part in them. The supervisor takes the position that her research was directed at obtaining a PhD and that objective is about to be achieved.

QUESTIONS

- Are there ethical issues here? If so what are they?
- Does the student have a genuine and well-founded grievance towards her supervisor?
- Should the student take any further action?
- What would you have done if you were the supervisor?
- Based on a case study in Shamoo, A.E. and Resnik, D.B. (2003) *Responsible Conduct of Research*, OUP