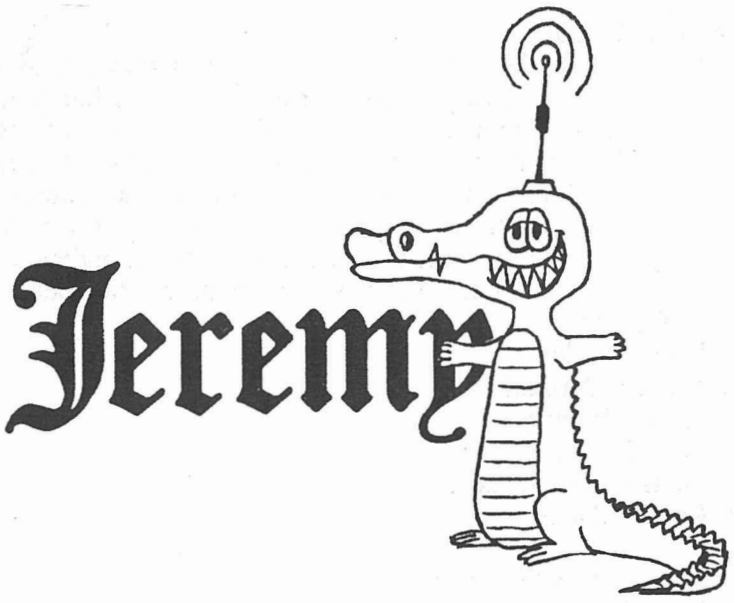


The Official Journal of The University of Sydney Physics Society

Volume 6 Number 2 May 1990

Editorial

G'day and welcome to the second issue of this major physics journal. To those of you who missed out on the last issue, welcome to the *Physics Society*. Be warned the contents of this journal are not to be taken internally, and if consumed, I refuse to be responsible for the results.

Being an editor isn't all it's cracked up to be, but then you get use to people running away from you screaming "It isn't finished! Leave me alone!". Yet your valiant editor has surmounted the problems, ignored assignment deadlines,etc. to bring this, the second issue of *Jeremy* to you. However we need your help, if you want to enjoy a fun fulled issue then you have to contribute - articles, quotes, drawings, etc. Send all material to us via the *Physics Society* mailbox, behind the door of the main office foyer and quickly. Thanks to all those who have submitted material, quotes etc.

In this issue of *Jeremy* there is more than you bargained for. We have the Physics Forum featuring the real Bodie Seneta, those who sent in the winning solutions (both of you) would have by nowcollected their magnificent prizes. Those of you who didn't bother get another chance in this issue to win a prize. Also in this issue,by the 'Dynamic Duo', we have part two of Alice, which includes a poem of all things. Who said physicists don't have emotions? Next up is an adventure in the second year lab. entitled 'Dick Hunstead's Holistic Physics Laboratory'. This story is the cause of the sign which used to be on the door of the second year lab, before it was removed. Then there is an article about television by a A. Nonymous. If he/she would care to prove his/her identity then there is a handful of *Kits Kats* waiting for him/her. As usual we have a great back page drawn by Derek McKay, just to prove that physicists can do other things besides solving equations.

I'm still looking for a fellow editor, many people have said they would love to help but ... If you would like to help then just drop me a note via the *Physoc* mailbox.

Finally I would like to thank the spelling checker on the Mac, without whom this issue would be riddled with mistakes, and last, but not least, Laurie Peak for the use of the Mac and printer.

The Editors: Richard Plantaganet (Physics II)
Someone Else (Physics ??)

J

Tiny Mutant Nazi Teddy Invade Physics Building

Everybody listening? Good!

The Physics Society have been very busy in the past months, since the last issue was published. The informal discussion groups have started again. We had Laurie Peak give a very enjoyable talk about AntiParticles which was well attended. Also Nigel O'Brian from pure maths gave a talk about Fractals, which was also very popular. These talks are aimed at first and second year students so if you have anything that you would like to learn more about, there will be a sheet outside the first year office where you can place your suggestion, or put it in the Physoc mailbox. All information will be received in the strictest confidence, and no correspondence will be entered into.

On to less exciting thing, the A.G.M was held and the new office bearers were elected. Those elected to positions are as follows:

President	Julian Dryden
Vice President	Tom McDermott
Secretary	Ariane Blanch
Treasury	Alex Forbes
Jeremy Eds	Richard Plantagenet
Party Coordinator	Ariane Blanch
Discussion & talks Coordinator	Daniel Belframi
Advertiser	Tom McDermott
Shopper	Neil Broderick
Mascots	David Mar
	Bodie Seneta

Most of these people are in second year, which promises well for the years to come as there will be lots of students able to run the society for the next few years at least. One of whom doesn't even do Physics!

One of the other major events so far has been the talk by the every popular Dr Ian Johnston on the subject of 'Music and Physics' . This talk proved very successful and lecture theatre eight was packed (If I might be allowed to used such a plebeian term). During the talk we learnt many usefully bits of knowledge such as what notes can be produced by a two metre long horn, as well as the fact that Verdi cheated in the triumph scene in Aida.

The last major event was the 'Flying Jelly' party which was well attended despite the predictions of certain prophets of gloom. The party when on into the late hours of the night, despite the fact that they were on holidays and didn't have to be in the Physics Building for another week or so. The problems surmounted to organise the party were unbelievable, from the staff leaving at 12:30pm to the BBQ getting stuck in the lift, as well as the lift getting stuck, yet were still able to get everything ready in time.

The great T-Shirt competition has drawn to a close, we're actually received four entries from students and these judges have decided to incorporate suggestions from three of the entries. The T-Shirts should be ready by the start of the second semester, if not before.

J

A Night on T.V

by

A. Nonymous,
Physics XVIII

Bert had had a hard day at Uni., so when he got home (which sort of assumes the staff actually let students escape from the physics lab.), he put on the television and settled back into his favorite chair with the infra red remote control (approx. 1000nm).

<< CLICK >>

A familiar face appeared on the cathode ray tube screen. "And in other new, a riot broke out in the 2nd year lab today as students demanded equal rights with cathode ray oscilloscopes. Staff used metre rulers, power cables and the 'Jumping ring experiment' to suppress...'

<< CLICK >>

Bert changed the channel - Anyway, he didn't like the news reader; it was his Oscillations and Waves lecturer, Brian McInnes. But the news was worst on the other commercial broadcasting frequencies, so he switched back to channel 9 and sat out the remainder of the news. Soon the weather came on.

"... And now for the weather", said Brian as a dead pan face appeared, "here's 'Thunderstorm James'."

"There won't be any thunder", said the dead pan face owned by Brian James, Thunderstorm expert who only smiles when there is atmospheric electrical activity.

<< CLICK >>

Bert changed to channel 10; it was an ad.

"Tonight on Neighbours, find out what happens to Max and his Tokamak; why is Astrophysics moving into room 318; and 'who is this Jeremy anyway'."

<< CLICK >>

Bert decided to stick out 'Thunderstorm James' until the end. "And that's the way it is, Tuesday, 31 April, 1990, I'm Brian McInnes... Goodnight"

Bert then watched 'A current Affair'; an hilarious comedy about why students hate electromagnetic induction. After it was over Bert looked at his watch ... 7:00 - what now?

<< CLICK >>

Let's try channel seven, thought Bert, as a bearded face appeared... "Good evening, I'm Derryn Johnston. Tonight on the programme we look at ..."

<< Click >>

"Tonight, on Australia's biggest bargain show, we're offering a radio telescope valued at $8M for only $75, A cyclotron valued at $75M for only $595 dollars and $200, 000 worth of research grants.

And now here's the star of the show - Laurie Peak ..." The thunderous applause which had welcomed Laurie was quickly switched off by the sound technician, as Laurie began to speak.

"da da da da de dum, G'day, what a wonderful audience we have here tonight...". Camera 1 points at Camera 2, the only other person in the lecture theatre...

<< CLICK >>

It was Derryn Johnston again. " A situation of a severe nature has been brought to my attention. Prepare to be shocked.

We have received here at the studio a report from an anonymous caller who wouldn't say his name that there are actually first year students who are enjoying lab. That's what I said: Enjoying lab. Now, that's just not on.

This is not a ratings stunt. We sent in a camera crew and saw it for ourselves. Now I ask you ... What sort of a low ratbag would even contemplate enjoying a lab session? Shame. Shame. Shame.

<< CLICK >>

Back to 'Lecture of the Century'. Bert watched with mild interest as three students were showered with questions and alpha particles. Nobody won anything.

When that finished another programme came on called 'New Faces' (in the physics department of course). The first person on the show was Max Brennan!!! What is he doing on 'New Faces' thought Bert as he scrambled for the T.V programme. No wonder, he said to himself; it was a 1923 repeat. Bert watched the show anyway. It wasn't to bad. It was by now 8:00pm (2000hrs for the Astronomers).

<< CLICK >>

Over to channel π (Government T.V) "I'm professor Melrose, and tonight on 'Quantum' we look at Schrodinger's Equation, the Bohr model of the atom and energy transitions. I mean what else do you expect to get from a low-budget programme called 'Quantum'."

<< CLICK >>

Bert had had enough television for one lifetime so he turned the television off. He couldn't put up with all that physics. Bert now put the radio on.

"And now on 105.251 MHz we have the latest heavy metal rock single... Here's 'Paul Walker and the Multimeters'..."

<< SMASH >> (It was not Bert's night)

J

The Kit Kat Quotes Competition

This year's quotes are flooding in, and the competition is hot (well greater than zero Kelvin anyway!) Seriously its obvious that we have some crazy lecturers out there! But what has happened to the physics staff, they appear to be in danger of being out done by foreigners. Can it be that mathematicians,engineers and even philosophers have learnt the noble art of giving entertaining lectures by the perpetration of ridiculous statements? We call on all students to save the physics staff from the ignominious end, by recording and submitting all the worthy quotes from the physics staff (and win a box of *Kit Kat*s in the process. Bring on the quotes and dammed be he that first cries hold enough.

Dick Collins:
"This is the concept that Frankl brings together with that word which is unmentionable now"
"You can look at these formulas here and have a nervous breakdown they're a big mess"
"Don't confuse me more than I'm confused"
"Lets just suppose for fun we reverse the variables"
"Somewhere between when I was your age and when I lost my hair ..."
"While its moving the charge is in a moving state"
"I need to talk you into a minus sign"
"We can now write a very interesting and possibly impossible to understand relationship"
"Choose a small flat volume"
"I guess I have to apologise for this in advance. We are going to go through a derivation that is very painful"
"Let me get out of this by the straight forward lectures' way: that's a standard integral which you can do"
"I've made enough mistakes without having to worry about trivial ones"

Laurie Peak:
"Poisson was a physicist and an astronomer"
"It's not exactly $\pi \times 10^7$, but its good enough for government workers as they say"

Dr Les Wood (guest lecturer for 3rd year)**:**
"Actually, Clausius' name is not Clausius. What it is I'm not sure; but I do know it's not Schnecklegruber"
"The mathematician follows the elephant with a bucket and shovel. The physicist rides the elephant telling it where to go"
"...And you have the Tds or Tedious equation"
"Engineers have this value of entropy; they never learn anything and they don't forget anything"

Paul Walker:
"I don't want any of those people with greek symbols coming out of their ear"
"Can't you tell I'm in making a point mode"
"If you don't have this facility, that is, you only have one font in your pencil..."
"Things tend to get older; you may have noticed this by now"

Michael Large:
"Funny enough you'd only feel a bit warm, despite the fact that that you were being cooked."

Lawrence Cram:
Student: "*You just want to win the quotes competition*!"
L.C: "Yes! I've got to get that prize!!"

Ian Sefton:
Student: "*What exactly is a material body*?"
Ian: "Anything that's made of, uh, material!"

FØRƎIGN QUOTES

John McMullen (Pure maths):
"Somewhere in the universe there's someone who understands what this means"
"This is for those of you who are still learning to walk in complex land"
"You may not be able to approach the point 'a' by a new ruling of the U.S supreme court"
"You give a preschool child a crayon and get them to scribble on the page, then you join up the ends and bingo, you have one of these curves"
"Assume its a charged mosquito in an electric field"
"I'm going to wave my hands and I don't want you to write it down"
"This is a picture and its not official"
"If you're a physicist and by finite you mean greater than zero then I'm not even going to talk to you"

Denis Winch (applied maths):
"The path is drawn in the Z-plane, it doesn't cost as much to draw it there"
"Analytic functions have the property of being interesting and dull at the same time"
"This makes something simple unnecessarily complicated"
"The next section looks a bit academic... but on the other hand it is university isn't it"

Bob Walters (Pure Maths):
"Just because you know what's going on, don't think something's wrong"
"Nobody knows what a circuit is- but it's just bits of wire"

Bob Howlett (Pure Maths):
"I don't know who Gram and Schmitt were, but they were very lucky to get their names attached to something so simple"

Alan Chalmers (History and Philosophy of Science):
"People aren't like electrons and billiard balls"

Grant Steven (Mechanics of Solids):
"When I was young I always wanted to grow up to be an engineer and be happy"

Dr Lai (Pure Maths):
"Why are you here?... So you can study maths. Why are you studying maths? ... So you can get your degree. Why do you want your degree? ... So you can graduate, get a good job and buy yourself a nice dog."

David Feng (Computer Science):
Student: " *Can you move the board please?*"
D.Feng: "huh, turn the lights on?"
Student: "*No, just move the board please*?"
D.Feng: "Sorry speak louder"
Student: "*MOVE THE BOARD*"
D.Feng: "I can't understand your question. Come and see me after class"

Howard D'Abrera (Mathematical Statistics):
"... so you get blob plus star all squared equals blob squared plus star squared plus two blob star.."

D. Easelown (Pure Maths):
"The inverse of 3 is 2, because 3x2 is 1 right?"

Dr Cartwright (Pure Maths):
"Wake up, now. It's fun time!"
"No doubt you have a sinking feeling about sequences and series"

Dick Hunstead's

Holistic Physics Laboratory

By

Neil Broderick.

High on a wooden bench sat an electric plotter. From under its cover it stared down at the second year lab, with which it was having a problem. The electric plotter was a labour saving device, like a dishwasher or a video recorder. Electric plotters drew graphs for you, thus saving you an increasingly onerous task, that of drawing all the graphs the Physics School expected you to draw.

Unfortunately this plotter had developed a problem. It had started drawing graphs more or less at random. The plotter had gone wrong when it was given to much too draw at once. So after a week of changing straight lines to sine waves and plotting linear curves on logarithmic graph paper, they called in the repairman. He pointed out that for half the cost of repairing the plotter you could buy a new improved model. So the plotter was given a bench of its own where it could draw whatever it liked.

Today was a Wednesday of the worst kind. Across the square scurried two mismatched figures, the taller one was old and was starting to go bald, while the younger one moved liked one who was late for an important engagement to which he did not wish to go. "So young Richard",remarked the professor, "It has been nice seeing you again." . Richard was pleased at that for it was the first sign that the professor knew who he was and who Richard was. Richard had met the professor at a *Physoc* party and had established an immediate rapport with him. Neither Richard or anybody else knew the professor's name or his area of research. He was just one of those people who seem to inhabit university corridors without apparently aging or doing any work. It has been suggested that they are necessary for the success of the university but this has never been proved. Every year the professor avoided doing any work by the time honoured method of holding all his lectures in Lecture Room 3 and then throwing a tantrum if anyone asked him where it was.

Richard had left the professor at the main door before going off to the second year labs, leaving the professor to wander through whatever corridors he felt like. For some reason there was a Grand Piano stuck on the stair-well. Near it several lectures were arguing. "Great astrophysical significance", said one. Another replied saying "that it can't be stuck there it was brought in so it can be brought out", while the third one muttered and began looking for a large chain saw. The last said that it must be a third year acoustic experiment as it was out of tune. Richard clambered over the piano and reached the second floor, where his attention was caught by a piano revolving on a Macintosh. It didn't take Richard long to work out it was a simulation of the untuned piano down below and in fact it was stuck.

Richard then climbed the final fight of stairs leading to the second year lab. On the front door he found a shiny brass plaque which read:

Dick Hunstead's

Holistic Physics Laboratory

We solve the whole experiment
We find the whole answer
Experiment today for the whole solution to your problem.
(Missing units and messy figures a speciality)

Richard pushed open the door and went in, not to sure of what to expect. As he began to walk up the stairs he hear the following conversation. "I'm very glad you asked me that, Elizabeth. The term *holistic* refers to my conviction that what we are concerned with here is the fundamental interconnectedness of all things. I do not concern myself with such petty things as multimeters, telltale pieces of data, and inane measurements. I see the solution to each experiment as being detectable in the pattern and the web of the whole. The connections between cause and effect are often more subtle and complex than we with our rough and ready understanding of the physical world might naturally suppose."

Richard continued walking up the stairs to his bench, where the X-Y plotter thought that his anode was a strange attractor. His partner had also just arrived so they sat down to begin the days work. As they were about to take their last measurement a voice from behind them said, "Rule One,

never pay attention to somebody while making a measurement." Richard and his partner froze, who lay behind that voice they wondered. "Rule Two", the voice continued, "Preparation, always read the lab manual before coming here. Try to have some idea of what you intend to do before you do it.

"Rule Three remember rule two."

" I run a course, if your interested", hissed the voice from behind.

"What!", said Richard trying to regain control of himself.

"Rule Four, never leave equipment where it can be damaged. You're learning, if you were learning quickly you would be paying attention to the multimeter and not to me. I don't actually run a course for novice experimenters as it happens, tempting as it is, I'm sure there would be grants available. If we have to have them they may as well me well trained.

"However I'm curious to see how well you two are coping, so when your finished bring your lab books down to me."

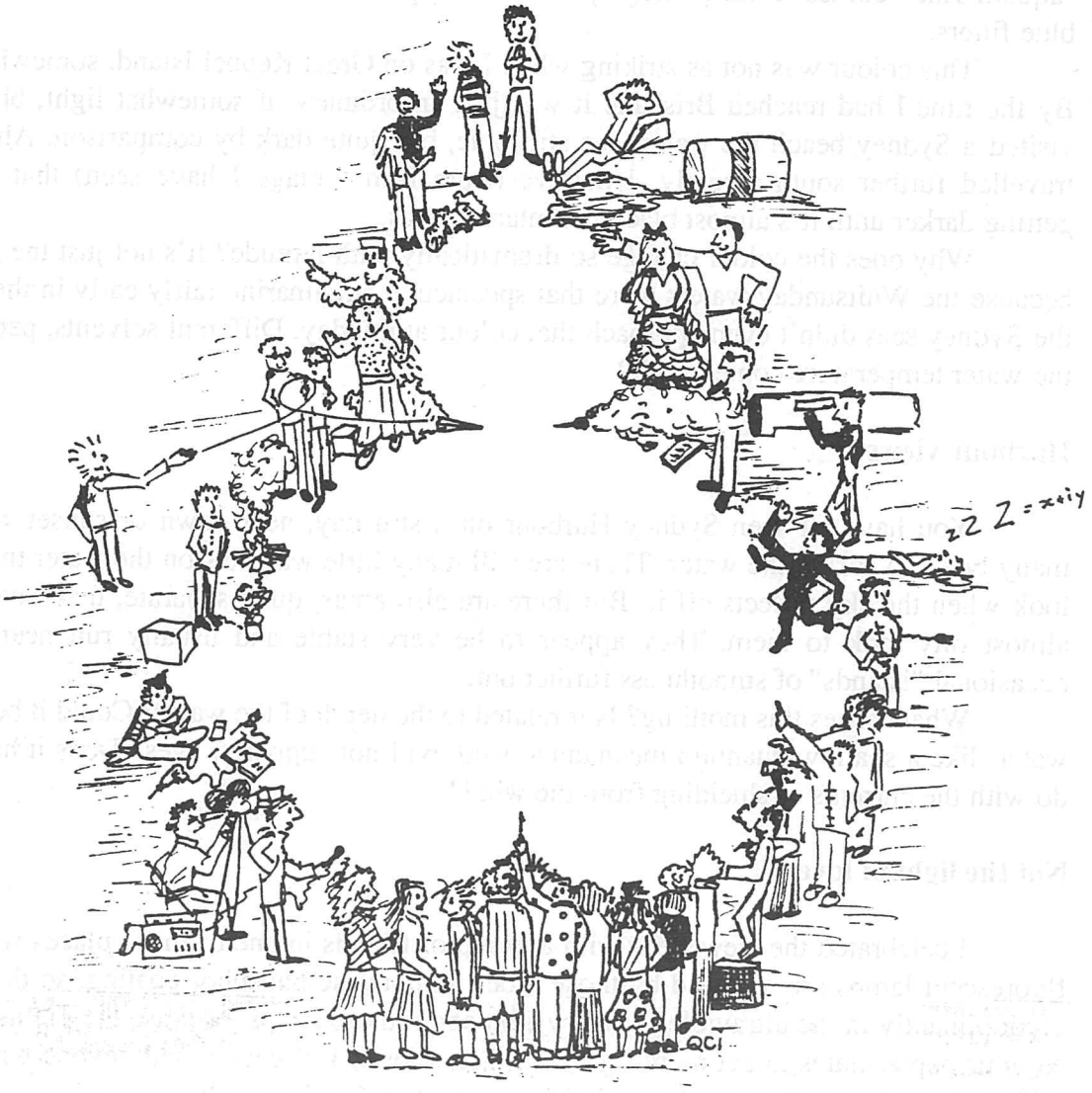
"What for?", asked Richard.

"To mark the bloody things", and with that Dick Hunstead walked back down stairs.

After the excitement had died down one of the demonstrators came up to them and said "You're in for it now, Dick sure to send you back and make you redo most of in a holistic way".Richard and his partner looked at each other and wondered what they had got themselves into.

Finally they had answered the questions, drawn a conclusion (unfortantly it's the one thing a electric plotter can't draw) and were ready to go downstairs. When they reached the bottom they looked for Dick but he was not in sight. Suddenly they realised that it was four o'clock and he had gone to tea. Finally the awful truth hit them, they had entered the Long Dark Physics Prac of the Soul and there was no escape.

To be continued



A Chaotic Physsoc Party . . .

Physics Forum

by Bodie Seneta (this time it's true)

Yes, I'm back and actually writing for *Jeremy* again (after some prodding from Neil). If this is the first time you're reading my work, welcome. For the rest of you, welcome back, and I hope you enjoyed your break. Finally, thank you to David and Neil for filling in for me in the first issue of the year - the glamourous sounding "travel commitments" were actually a trip up to the Australia Telescope site for ten days, not exactly a tropical paradise, so don't feel too jealous.

This issue I have three new puzzles for you, of mainly an aquatic nature. I don't know the answer to any of them:

Watercolours

During late January I was in the Whitsundays, a very beautiful group of islands off the coast somewhat south of Townsville. The first thing I noticed on seeing the ocean from that far north was that the water was a brilliant, almost luminous light blue-green. Now I know where the colour "aquamarine" comes from. Photographs do not reproduce it at all well, even when taken through blue filters.

This colour was not as striking when I was on Great Keppel Island, somewhat further south. By the time I had reached Brisbane it was just an ordinary, if somewhat light, blue. When I next visited a Sydney beach the water was still blue, but quite dark by comparison. Although I haven't travelled further south recently, I believe (from film footage I have seen) that the water keeps getting darker until it's almost black in Antarctic seas.

Why does the colour change so dramatically with latitude? It's not just the angle of the sun, because the Whitsunday waters were that spectacular aquamarine fairly early in the morning, while the Sydney seas didn't even approach that colour at midday. Different solvents, perhaps? How does the water temperature come into it?

Harbour views

You have all seen Sydney Harbour on a still day, near dawn or sunset when there aren't many boats to stir up the water. There are still many little wavelets on the water that give it a matte look when the sky reflects off it. But there are also areas, quite separate, that have a very smooth, almost oily look to them. They appear to be very stable and usually run near the shore, with occasional "islands" of smoothness further out.

What causes this mottling? Is it related to the depth of the water? Could it be that the shallow water, like a shallow quantum mechanical well, will not support waves? Does it have something to do with the currents or shielding from the wind?

Not the light of love

I celebrated the New Year with a group of friends in one of those places where the ordinary fluorescent lamps are replaced by those tubes without the phosphor coating, so that the radiation is predominantly in the ultraviolet. I worry a bit about these lamps, because they're used in dim rooms, so your pupil dilates to get more light, but then a lot of UV gets in and anyone who looks at a tube for a little while stands a pretty good chance of getting conjunctivitis.

The lights made things fluoresce in interesting ways, which I expected, but I was unprepared for what happened to a friend's eyes - her pupils actually glowed a deep violet, just like the monsters' eyes in a cheap B-grade movie. It was very difficult to talk to her because she would look at me while she was listening, completely unaware of the ongoing special effects, and stopping me with that utterly alien gaze.

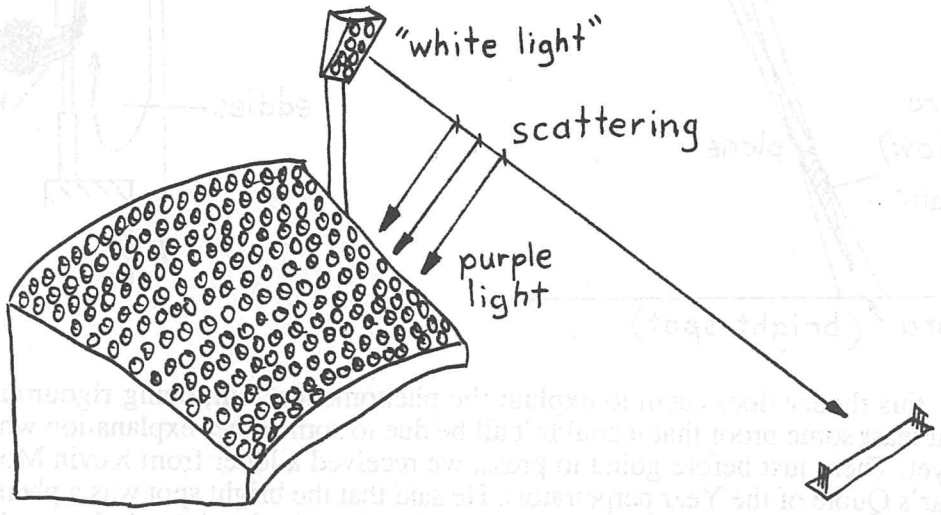
What could cause a person's eyes to fluoresce in this way? I saw no-one else that evening with luminous eyes, including myself (I looked in a mirror). The person in question was wearing contact lenses at the time, but I don't think that has much to do with it because I was, too, and my pupils remained obstinately dark. Maybe she has some unusual fluorescent pigment in her retina or in the transparent fluid in her eyes.

While we're on the subject of fluorescent lighting, last year I left you with an assignment - to inspect your credit cards under the UV light often found at nightclubs and other places. What do you see? Visa cards usually have a line drawing of a dove and Mastercards have the letters "MC" displayed twice (my latest card doesn't, however, so this anti-forgery measure might be falling out of favour with the banks). The markings are obvious under black light but invisible otherwise. Some debit cards also have black light markings on them.

As David and Neil were partly responsible for the last column, they have been collecting replies - so I'll give them the floor for the next bit.

Yes, and . . . straight to the point. Solutions were presented to us for all three of the problems (quite amazing, really). Night Cricket turned out to be quite straightforward, with what we are pretty sure is the correct solution coming from a couple of people: David Johnston of fourth year and Andrew Melatos of third year. Andrew's written solution is reproduced here:

" 'White' light from the floodlights is scattered by molecules in the air. Short wavelengths, like purple, are scattered most strongly and in a direction almost perpendicular to the incident light, while the remaining (redder) wavelengths are transmitted. Naturally, the SCG lights are directed down towards the pitch, so the scattered purple light shines at the stands."

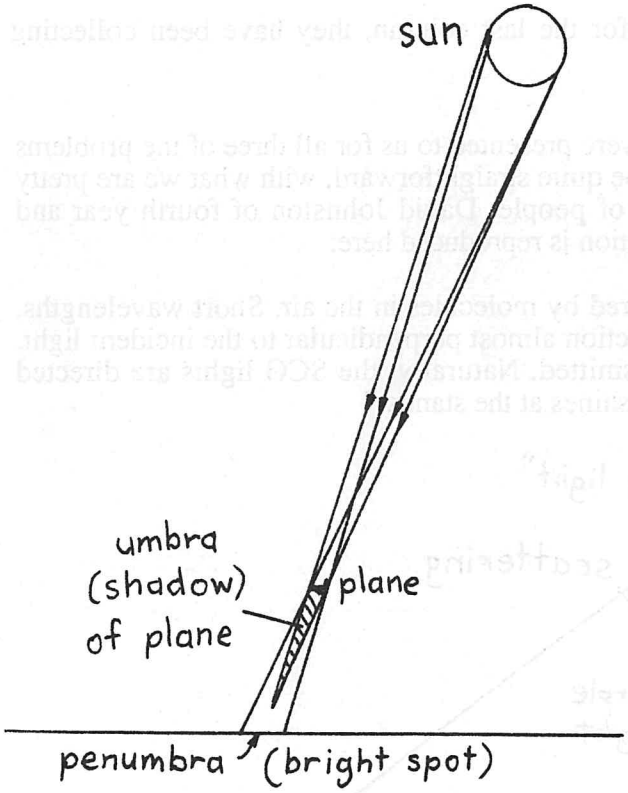


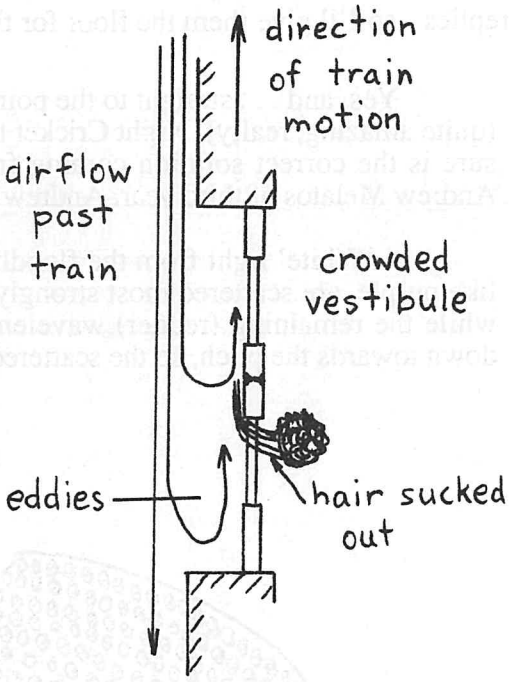
He included a diagram which (after a bit of sprucing up for publication) shows how this effect leads to the night sky appearing purple. As can be seen, this only works for people inside the SCG. Elsewhere, says Andrew, the angles are wrong. The effect described is in fact just Rayleigh scattering, which causes the day-time sky to appear blue, due to scattered sunlight (at least when it's not raining). It is interesting to note that the SCG lights, which are mercury vapour lamps, have a much higher proportion of violet light over blue in their spectrum than the sun does. Perhaps if other lamps were used, the "Night Cricket" effect would have a different colour?

So there you have it. An interesting phenomenon explained satisfactorily with Physics. For his efforts, Andrew will be rewarded with a handful of Kit Kats from our sponsorship horde.

The Bright Spot problem has also attracted a solution, but one which is by no means as straightforward. Astrophysics postgraduate Alan Roy immediately propounded his theory of the bright spot, which he had formulated through many hours of light plane flying, when presented with his issue of *Jeremy*. Although his idea sounded quite plausible, we at first retained a little scientific scepticism about its reality. His explanation goes like this:

When, as seen from the ground, the aeroplane subtends a smaller angle than the sun, no shadow will appear because the sunlight reaches the ground from around the silhouette of the plane. Further, all of the little bits of shadow on the ground due to blades of grass or leaves or such will fall *directly behind the object causing the shadow*, as seen from the plane. This means that an area around where you would expect the plane's shadow to be is illuminated squarely and fully by the sun, with no areas of shadow whatsoever. The surrounding land, by contrast, will have areas of shadow as cast by the blades of grass, this time *not* directly behind the blades. In fact, this is what is normally seen by anyone looking at any patch of sunny ground. Roughly fifty percent of the area seen is in fact in this "micro-shadow" effect. But, says Alan, when you see the patch of ground without these micro-shadows, your brain subconsciously makes the comparison to the surrounding area and interprets it as a bright spot. Alan goes further to say that this effect should have a reasonably well-defined edge, at the penumbra of the sun/plane system, which seems to square with what is observed.





Yes, this theory does seem to explain the phenomenon, but, being rigourous scientists, we demanded at least some proof that it couldn't all be due to some other explanation which nobody had thought of yet. Then, just before going to press, we received a letter from Kevin Moore (none other than last year's Quote of the Year perpetrator). He said that the bright spot was a phenomenon known as *heiligenschein*, which is actually well understood (at least in the right circles) and documented in the book *Rainbows, Haloes and Glories*, by Robert Greenler. The explanation is exactly as Alan deduced. Well done, Alan; and a handful of Kit Kats!

The Crowded Trains and Long Hair problem was a bit of a sleeper, only attracting an attempted explanation a week or so before press time. Kim Lester, High Energy Physics postgrad, suggested that the woman's hair was drawn forwards in part of a turbulent air stream. Since the train doors are recessed from the outer surface of the train, small eddies of air can be set up in the recess, as shown in the diagram. Kevin Moore, in his letter, also said that this might be the case. This seems to be the most logical explanation and, since no other has been put forward, it looks like we have to accept it.

Oh, one more thing. Kevin also suggested a solution to the Night Cricket problem. He said that the eye adapts to the greenish light of mercury vapour lamps, so that the illumination appears white. When you, with your colour adapted eye, look at something which is not illuminated by the SCG lights it takes on a cast of the complementary colour, magenta. This seems to conflict with Andrew's explanation. We ran up to the second year lab to have a look at a mercury vapour spectrum and found that it does indeed have strong green emission lines. Perhaps a bit more insight was gained when we removed our eyes from the spectroscope and saw that the mercury lamp was glowing bright violet, the violet emission obviously overwhelming the green. So sorry, Kevin; looks like you backed a loser. But two out of three isn't bad: Kit Kats next time we see you!

Well, it's been fun filling in for Bodie, but it takes time and effort so we're glad he's back to take over the job. Show your support by sending any solutions or problems of your own to the Physoc mailbox.

— NB, DM.

J

In God's kitchen

Alice's Adventures in Physics One-derland

by David Mar and Kim Lester.

Chapter Two

A Mad Tea Party

Alice walked a little way down the corridor, and had not gone much farther before she came in sight of the flight of stairs mentioned by the Cheshire Johnston. Not having much in the way of better things to do, she climbed the stairs, fully expecting to be set upon by someone for venturing in to some place or other where she was not allowed.

When she reached the top of the stairs, she turned around and saw a procession of people walking into what looked to Alice to be a tea room. "Well," thought Alice, "at least in a tea room there ought to be some friendly atmosphere and a bit more interesting conversation."

So thinking, she entered the room to see several tables set out in it. Several people were having tea in the room. The room was a large one, but the people were all crowded together at one table. "No room! No room!" they cried out when they saw Alice coming. "There's *plenty* of room!" said Alice indignantly, and she sat down in a chair on an adjacent table.

She turned to face the people at the other table and noticed that they were all now busily ignoring her. "Well!" said Alice angrily, "That is not very civil behaviour at all!"

She turned back to the table, and was just about to reach for a pot in order to pour herself a cup of tea, when another group of people entered the room and proceeded directly to the table at which she was sitting. They sat down and immediately one of them began talking to her. "I haven't seen you around here before. Are you new?" he said.

"Come, we shall have some fun now!" thought Alice. "Why yes. My name is Alice. How do you do?" she added aloud.

"Pleased to meet you," said the man. "I'm Bill Tango. I do stellar interferometry. What branch of astronomy are you in to?"

Alice was a little taken aback by this turn of the conversation. "I'm sorry," she said, "but I'm just a little girl. I don't do any astronomy at all."

"What?!" said Bill Tango, making Alice jump with the sudden hostility in his voice. "She doesn't do astronomy!" he added to the rest of the people at the table, who were now all staring severely at Alice. "Are you," said one of them, in a very low voice which made all of the rest of the table's occupants stoop their heads towards him, whilst keeping their eyes heavily on Alice and awaiting the answer with hushed expectation, "a theoretician?"

There was a collective gasp from the rest of the people at the table and they all appeared to Alice to adjust their chairs so that they were just a little further away from her than they had been previously. They all stared at her nervously. "No," said Alice, very slowly, for she was not at all sure of what reaction she might provoke next, "I'm not one of those either."

The table seemed to breathe a collective sigh of relief. "Well that's all right then," said Bill Tango. "We just thought you might have been one of . . ." and here he raised his head and craned his neck as he looked searchingly around the room, until at last his eyes alighted on the first table full of people that Alice had seen when she had entered the room, ". . . them."

Alice thought this very strange behaviour. "Why did you have to look around for them?" she asked, "Surely you must see them every day?"

"We have *tea* every day, but we don't really ever *see* each other. That's just the way it is," he said with a shrug of his shoulders. "But enough of that. Would you like to hear a song?"

"Oh yes," said Alice, who was now really beginning to enjoy herself.

Bill Tango began:

"Twinkle, twinkle, little star!
How I wonder what you are!
Up above the world so high,
A ball of gas beyond the sky.

I use my telescope and take
Spectra of the lines you make;

I can detect hydrogen,
Helium and nitrogen.

Fusion processes emit
The photons that keep you lit,
And maintain integrity
Against collapse by gravity.

Hundreds of light years away,
Spinning roughly once a day;
10^9 metres wide
Is your measure, side to side.

Made of interstellar gas,
A million earths is your mass;
A billion years 'til you're done,
A red giant to become.

Then you'll go supernova,
Stellar life will be over;
Your core will take on a new role,
Collapsing to a black hole."

"That was very nice," said Alice politely, while thinking that she might never look at stars in *quite* the same way ever again.

One of the other astronomers announced that tea time was over and that everyone was expected at the Queen of Hearts' croquet game. Alice quite liked playing croquet when she was at home, so she felt rather excited by this new development. She was getting up from her seat like everyone else when one of the astronomers asked her, "Do you know much physics?"

"Physics?" answered Alice, "Why, no, I don't know any at all."

"Then you can't play with us!" returned the astronomer, and promptly ran out of the tea room, followed quickly by all of the rest of the group. Alice was shocked by this very rude behaviour and by the time she had recovered and followed them to the tea room door, they were nowhere to be seen. Even the theoreticians had disappeared.

She looked around and found that she was totally alone. Poor Alice! She could not think why not knowing any physics would make everybody suddenly dislike her, and she began to feel very lonely: she sat down and began to cry. "You ought to be ashamed of yourself," she said, "a great girl like you to go on crying in this way! Stop this moment, I tell you!" But she went on all the same, shedding gallons of tears, until there was a large pool all around her, about four inches deep and reaching halfway down the hall.

The next thing Alice knew, she was up to her chin in salt water. "Oh!" she said, "I wish I hadn't cried so much!" She swam about, trying to find her way out, and did not notice that the current was taking her near to the stairs up which she had recently climbed. Before she could do anything at all about it, she was swept along and down the stairs, to be deposited like so much driftwood on the floor just outside of an open set of double doors.

This was a place which she had not explored yet! "Maybe," thought Alice, "there is something in here that can teach me about physics, so that I can make a few friends around here!" She walked in and saw that the room was a lecture theatre. "I suppose there ought to be something in here that can help; but the great question is 'what?' "

Alice looked all round her at the lecture benches and rows of seats, but she could not see anything that looked like it could teach her about physics. There was a large mushroom growing behind the front desk, and it occurred to Alice that she may as well see what was on top of it. She stretched herself up on tiptoe, and her eyes immediately met those of a large blue caterpillar, sitting on the top, with its arms folded, quietly smoking a long hookah.

"What do *you* want?" said the caterpillar.

Alice replied, rather shyly, "I - I want to learn some physics."

"Well," replied the caterpillar, "You've come to the right place! I'm a Paul Walkerpillar!"

To Be Continued.

J

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