THE SCIENCE BULLETIN.

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I would like to thank all those who contributed articles and helped with production. Special thanks to Paul and John. Best wishes to the future Editor(s), who (hopefully) will be starting next year. Good luck to all in exams.

Sandra Muirhead.

EDITORIAL.

It's not that easy being green. Ask any chloroplast. Photosynthesising from sun up to sun down, the green plant could not survive without him. And life for the grass is no bed of roses - it grows only to be eaten or cut off in its prime by some vicious lawnmower.

If you're green, you're also grouped with 'little green men!, green cheese, slime, envy, and a host of other undesirable greenies.

But by far the most difficult lot belongs to our green friends, the frogs. Firstly they have to survive, as tadpoles, the perils of natural preditors, and then the emotionally trying period of entering froghood. Once frogs, they face all kinds of danger - roving Biology I students who can't wait to get their scalpels into the poor unsuspecting creatures and hunt for parasites (see report within), cordon-bleu French chefs, who aren't at all interested in the parasites, and grotty little primary school boys who capture frogs for their 'nature studies'. Frogs which return to their home ground for breeding must make their annual dash across roads and highways, taking care to escape the wheels of fate. Even puppet frogs can't live without fear - they're always being chased by the pigs.

Having now stirred within you feelings of compunction for this often maligned creature, we dedicate the most part of this light-hearted edition to the frog.

Sandra Muirhead
(standing in)

The editor (even though there isn't one at present) would like to hear from readers. Please post your letters and/or articles to The Editor, Science Bulletin, AUScA, c/- SAUA Office or put them in the Bulletin pigeon hole in Room 56 (behind the bar) or hand to Sandra.

Thanks.

AUScA Vs. AUTS CRICKET MATCH 30/9/79.

This has nothing to do with frogs.

After a slow gathering of players at the West Beach playing fields, the captains got together for the roll-up. Temperance chose Label up and put AUScA in to bat.

Temperance fast bowler Douglas took the wicket of opener Wilson and gave AUScA something to think about. At this point, Umpire Marlin was attacked by the whole Temperance team and had his port stolen.

At the change of bowling, Elferink displayed unorthodox style and bowled Edwards for two. Kathleen Sook then went in and stayed for fifteen minutes before being bowled for zilch runs. Peterson was dismissed by John for seven and moritz took over to run a swift eleven before being caught brilliantly at mid on by Bayley. "Mullet" Pattichis in his first ever cricket match put up four before being caught LBW on a dubious ball from Douglas and even more dubious decision from Eberhardt (AUTS Lord High Moderator). Van Zetten had five before falling to Douglas four balls later. Helen Zowty's was bowled by Eberhardt for four and Marlin scored one not out. Seven Wides by AUTS brought the Science Association score to 41.

The cheats came out to bat against a formidible bowling and fielding side who contained the temperance team well. Douglas and Elferink saved the team with 10 runs and 8 runs respectively before Elferink was bowled by Wilson and Douglas retired. Bronwyn Treloar scored two not out, Bayley's wicket fell to AUScA's pace bowler Peterson as did Eberhardt. Fearnley retired on four and Ulrik John was caught brilliantly behind by Edwards (me). Dundon scores three and Maddocks one, both not out. AUTS total - 49 for 4.

The second innings was hit and run, AUScA showed their mettle with 46 runs, with two sixes and two fours scored by Edwards before he stepped on his stumps. With Extras, AUScA 2nd innings total was 52 for 7.

AUTS hit the skids at this point and were hammered by excellent bowling taking five wickets and fielding running out three, for a measly 23 all out. AUScA proved who was best.

Thanks to all who turned up and to Andy Eberhardt who put up with everybody for a barbecue tea later on.

John (Captain AUScA)

ANIMAL DISSECTIONS FOR BIOLOGY I OR HOW TO CATCH FROGS. J. Edwards.

In Biology recently we were informed a certain prac. involved BYOF - Bring your own frog - in order to search for parasites. As a dependable (!) and conscientious (!!) student, I took this request as a command and accompanied by my sidekick sallied forth.

You may remember the evening of October 9th to be particularly wet. In fact it hissed down. Undaunted, we arrived at War Memorial Drive and slid, slithered and struggled to beneath the Frome Road bridge. After stumbling about in the dark fro twenty minutes I came to the conclusion that as I am not a bat, I could not home in on the sound of seven million frogs without a torch. Also a chill was rapidly becoming evident in my holeproof, runproof, skidproof, antimagnetic, definitely not waterproof Bonds hipsters. We retreated to the car with audible sniggers drifting from the riverbank.

During the drive home along War Memorial Drive, my thoughts of the elusive frog (Order Salienta - Family Ranidae) were shattered by Kathleen yelling - "FROG", as a green object flashed through the headlight beam to disappear in the undergrowth. We reversed and left the road to drive in pursuit, not an easy matter in a morris. Giving up but by now experienced in the ways of wily amphibians we drove slowly ahead until there he was.

Armed only with a scalpel and a woolworths icecream container I leapt into the frog and after a brief scuffle, he was in the bag so to speak.

Next day in Biology I presented my rare catch to a demonstrator with the instructions, "Kill".

"You don't want me to kill him do you?" she asked
"Well I...."
"He's beautiful".
"But I...."
"Please don't ask me to kill him".

Touched by this plea and transfixed by accusing stares I relented and cut up a fish instead.

The journey home was a memorable one. Have you ever got onto a No. 10 bus carrying a frog in a Woolworths Icecream container, smelling of freshly dissected mullet?

The points I'd like to make are these:-

a) Was BYOF a joke? Do the demonstrators realise how hard it is to catch a frog
b) Why did nobody intervene on behalf of the fish? Are frogs more lovable than fish?
c) How much should a frog (unemployed) pay for STA bus trips?
d) Consider how much the University would save if we had a TYO exam paper, BYO lecturer, BYO tutor, even BYO degree (Hons).

John.

P.S. Anybody want an unused frog?

SYMMETRY IN NATURE. 4

When you or I want to describe something, we use words, eg., big, small, red, dark, rough, etc. When physicists describe something they are studying, they use numbers, eg., 50^{o} Celcius, 61 Kilograms, 10^{3} meters, 54 Kilopascals etc. This type of description is called "quantification".

Just about anything can be described by qualification of its properties: All we need is some form of standard to compare with. (This is exactly what a metre is. Similar "standards" have been adopted for temperature, pressure, etc.) We can even quantify color, roughness, brightness and many other less obvious quantities.

So, one could describe just about anything by using sets of numbers. (In fact, there is a whole theory in mathematics on just this topic). You may wonder what this has got to do with symmetry. Well, it ends up that it is the symmetries in nature which decide what quantities we can use to describe natural phenomena such that our description is not incredibly complicated or difficult to appreciate.

Let us say that we have some "thing" we want to describe. This "thing" could be a tree or someone flying a kite or even the gas in a baloon or the workings of a television tube, or the sun. Since there are so many possible "things", we use the symbol H to represent any one of those "things".

Now, the "thing" H could be in any one of a multitude of conditions. Eg., the tree could be standing tall or chopped down. The balloon could be really highly inflated or almost flat, the TV tube could be on or off etc. So, H covers many possible situations. So, we label these situations by (S) say.

Now (S) is not necessarily just one number, it could be a whole bunch of numbers. Eg., the tree could be described by its highest point above ground level, also the number of branches, also the lengths of the branches, the size of its leaves etc. So, we see that in describing any one condition in which the "thing" H may be, could require many numbers.

Just recapping; we have a thing H which could be in any one of a whole set of conditions each of which is described by an (S) and each (S) could be a fairly complicated collection of numbers.

Therefore, for a given thing H, we have a whole bunch of (S)'s. Say we want to look at just one facet of H. eg., we only want to know the height of the tree. How do we get this information out of each (S).

Mathematically, this is done by "operating" on (S) by an "operator" which picks out that facet (ie the height of the tree). We can represent this action of "picking out" that property by the equation.

$$H(S) = h\ (S) \qquad (1)$$

Where H is the "height operator" and h is the actual height of the tree in condition (S).

So, we see that for different canditions (S) and (S^{1}) say, we could get h different from h^{1} (eg, (S) could be the tree standing high and h its height and (S^{1}) the tree chopped down and h^{1} the (vertical) height of the felled tree). There could be a collection of operations like H, eg., we could have an operator N giving N(S) = n(S) where in the number of branches, also L giving L(S) = l(S) where l is the length the branches and so on. We still haven't discussed symmetry in all this, but we shall now get onto this.

Let us assume that you and I descirbed something H, (The tree say), but between the time when you described it and when I described it, someone chopped it down. Then, your bunch of numbers h, l, n etc. (referred to above) and mine would differ because yours would describe a standing tree and mine a felled tree. So we would not have seen the same thing.

But, if you described the tree from a distance of ten meters and I from a distance of twenty, (the tree standing in both cases) we would get the same results.

We can represent the effect on our measurements of such changes in the relationship between us and H, by a transformation which describes the change. Let us look at our tree. If (S) describes the standing tree, and (S^1) the felled tree, we can write

$$(S^1) = C(S) \qquad (2)$$

Where C represents "chopped down", i.e. if we apply our "chopping transformation" C to the standing tree, we get (S^1) the fallen tree. We can write this equation down (in most cases) because (S) and (S^1) describe the thing (ie. tree) and both represent a possible situation. (We would feel less confident if we had (S^1) = W(S) where W represents the tree sprouting wings).

Similarly, we can represent the change due to me being ten meters further away by

$$(S^{11}) = M(S) \qquad (3)$$

Where (S^{11}) is the tree as I see it after moving (M) from the position where you were looking at the tree (and (S) corresponds to your view). So, using equations 1 and 2, we see that the height after the tree has been chopped down is

$$h^1 (S^1) = H(S^1) = HC(S) \qquad (4)$$

Where h^1 is the height of the fallen tree given by $H(S^1)$, but by equation 2 $(S^1) = C(S)$.

So we have equation 4.

Note that we can easily see that HC(S) represents measuring the height (H) <u>after</u> chopping the tree down (C) because the H is second in line after the C from the (S).

We also have chopping the tree down after measuring the height, we represent this by

$$CH(S) = Ch(S) - hC(S) = h(S^1) \qquad (5)$$

We can write Ch(S) - hC(S) because h is just a number and C affects (S) only. Comparing 4 and 5, we see we have

$$h_1^1(S^1) \neq h(S^1)$$

ie $$h^1 \neq h \qquad (6)$$

Where = is "not equal to". This statement (ie $h^1 \neq h$) is obvious because the tr has been chopped down, so we know that 6 is true. But, by using 4 and 5 we see we have

$$HC(S) \neq CH(S)$$

Which can be written as HC(S) - CH(S) $\neq$ 0 (zero)

or as

$$(HC - CH)\ (S) \neq 0 \qquad (7)$$

Where we have used $(a - b)C = ac - bc$

We call the term (HC), defined by

$$(HC - CH) = (HC), \qquad (8)$$

the "commutator" of H and C (can you remember your highschool maths? ab = ba is called "commutation" of a and b).

Let us now look at the effect of me being ten meters behind you when measuring the tree. We have, if we move and then measure the tree

$$h^{11}\ (S^{11}) = H(S^{11}) = HM(S) \qquad (9)$$

On the other hand, if we measure the tree and then move, we have

$$h = h^{11}$$

Because moving doesn't alter the height of the tree.

So, in this case we have, from 9 and 10.

$$HM(S) = MH(S)$$

$$HM(S) - MH(S) = (HM - MH)\ (S)$$

$$(HM)\ (S) = 0 \qquad (11)$$

where we have used our definition given in 8.

We see that both 7 and 11 are true no matter what condition the tree is in, ie they are true for all (S). So, we can write from 7.

$$(HC) \neq 0 \qquad (12)$$

and from 11

$$(HM) = 0 \qquad (13)$$

We are now in a position to see when symmetry plays a role in describing nature. Let us assume that we are studying the sun. (ie. the sun is the "thing" H and (S) describes the various conditions the sun is in). Also, assume we have some quantity D which helps describe the sun (say, it's diameter). Then, whether we measure the diameter from an observatory in Australia or the UK makes no difference, so if T represents the effect of moving from Australia to UK we can write from 13.

$$(DT) = 0$$

Obviously, we do not want to get different answers for the two experiments. This is what we call a "symmetry" in nature, ie. if some process or transformation doesn't change our description of a "thing" then our description is symmetrical under that transformation.

In describing the sun, the diameter D is a good quantity to use, because under almost all the transformations we expect to happen, we get equation 13 holding true when it is replaced by D and M representing any of those transformations.

But, if we try to describe the sun by, say, its visual color at 6 p.m. in the evening on the first day of the year, we will not have a very good description because depending on the year or where we are, we will get a different color.

See if K represents color and T the trip from Australia to the UK, we see that we get

$$(KT) \neq 0$$

as in 12. So K is not symmetrical under T.

Infact, in physics, we try to find quantities which obey 13 to describe natural phenomenon. Not to say that quantities for which 12 is true are avoided, both groups play an important role.

The theory of operators which obey equations 12 and 13 is far, far deeper and wider reaching than the small aspect considered above. What is so beautiful about those two relations is their simplicity, yet the mathematical concept called the commutator (i.e (HM) is one of the most powerful tools for describing the phenomena in nature, whether it be a galaxy or an atom.

Kerry Hinton.

GASTRONOMY OF RANA ESCULENTA

Have you had a juicy bit of leg lately? If not, read on for a mouth-wakening experience. Imagine you are in a cosy resturant with soft lights and are gazing into a pair of eyes opposite you. Then you hear the words "Vos gremoilles M'soei" as a plate is slonked down in front of you bearing none other than ex-haunches of a frog (or is that haunches of an ex-frog).

You take a sip of wine while admiring the delicate sause with a slight tinge of green (herbs). Your prong (fork) slides easily into the flesh which comes adrift from the bone and gracefully arcs upwards between your lips.

Gently you roll the morcel around with your tongue appreciating its fine texture. The graceful combination of herbs and spices assuages hitherto undreampt-of passions as the meat melts in your mouth.

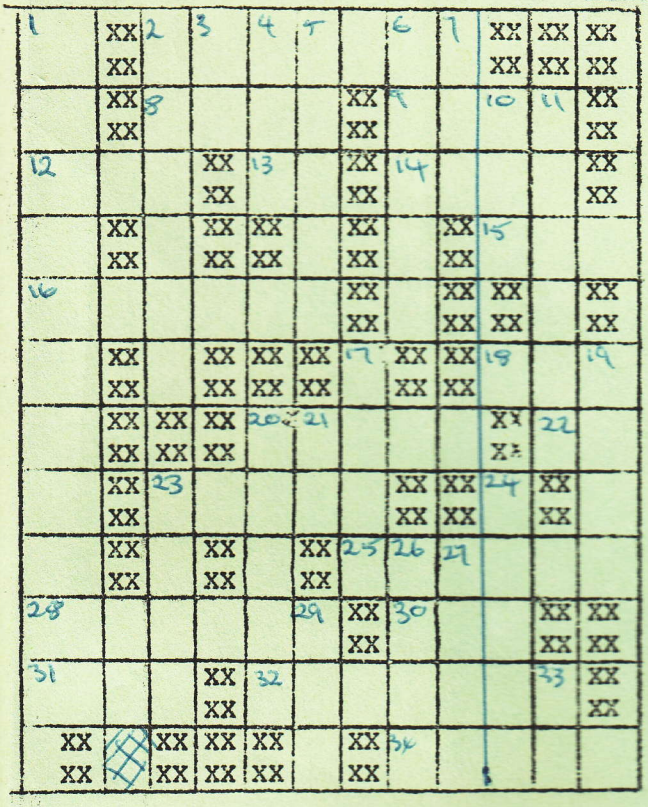
A second piece, attacked with more gusto, and a third and a fourth till all that remains is the bill.

GALACTIC ROADMAP

Constructive criticisms and summaries of any first or second year science or maths subjects can be sent to the Editor, Galactic Roadmap, c/o AUScA pigeon hole, S.A.U.A. office, for use in the orientation magazine to be published by the Science Association.

1
12
16
28
31
XX
XX

SCIENCE CROSSWORD



Down

1. Specific name - Cane toad.
2. Make equal.
3. Greek letter
4. Light which is not very intense.
5. Boot Country
6. Mistake, uncertainty
7. Large expanse of water.
10. Not only, but also.
11. Green M.C.
17. Plural marijuanae.
19. Pillage.
20. Generic name for wine grapes.
21. Standard of this crossword
23. Average nasty.
24. Line of junction of two upward sloping surfaces.
26. Sharpen finely.
29. Strong soap.
33. The Bulletin should have one.

26. Facial feature.

Across.

2. To finish I have made some salad vegetables.
8. End.
9. Stench.
12. Influenza.
13. Mother (Colloq)
14. Standard of reckoning.
15. Cathode Ray Oscilloscope.
16. Colour pattern on many frogs.
18. Mixture of fossil remains.
20. An effect achieved by using 18 across.
22. Not from.
23. Wet.
25. Geological formation.
28. Pyrimidine Base.
30. Brick carrier.
31. Male offspring.
32. Device for drawing in liquid.
34. What most animals try to satisfy.

SOLUTION TO LAST CROSSWORD.

	M	A			A	L	T	A	R
C	E	S	S	A	T	I	O	N	
A	S	P	E	N		L	O	C	H
T	H	I	R	S	T	Y		H	A
A		D	E	W			C	O	Y
C	H	I	N	E			A	R	C
O		S	E	R	O	U	S		O
M		T			A		T	I	C
B	U	R	E	T	T	E			K
S		A			S	M	I	T	S

ANALYSIS OF EXPERIMENTAL TERMS

Ever used any of the following terms...well now we know what you mean.

.Within an order of magnitude....Wrong.

.A surprise finding....We barely had time to revise the extract.

.Preliminary experiments have shown that....We did it once but couldn't repeat it.

.A survey of earlier literature....I even read some of last year's journals.

.Careful statistical analysis....After going through a dozen books, we finally found one obscure text that we could apply.

.We have a tentative explanation....I picked this up in a bull session the other night.

.The mechanism is not yet clear....We plan to do a second experiment when we get home.

.We say this with trepidation....I am about to make a statement about something I know nothing about.

...of great theoretical and practical importance....interesting to me.

.While it has not been possible to provide definite answers....The experiment didn't work.

.Three of the samples were chosen for detailed study....The results of the others didn't work and were ignored.

.Typical results are shown....The best results are shown.

.We are excited by this finding....It looks publishable.