It is the circumstance, that several of the islands possess their own species of the tortoise... that strikes me with wonder.

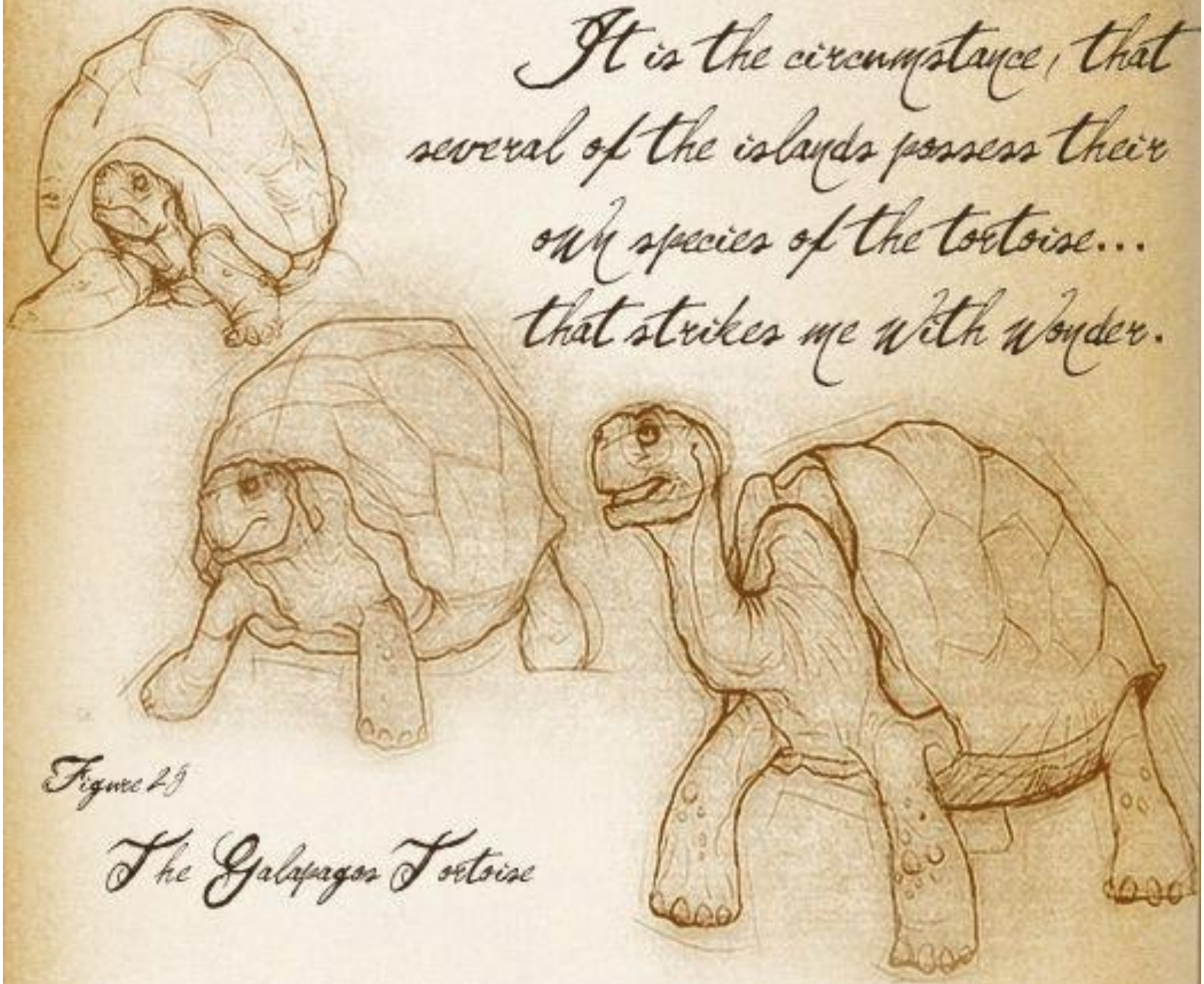


Figure 25

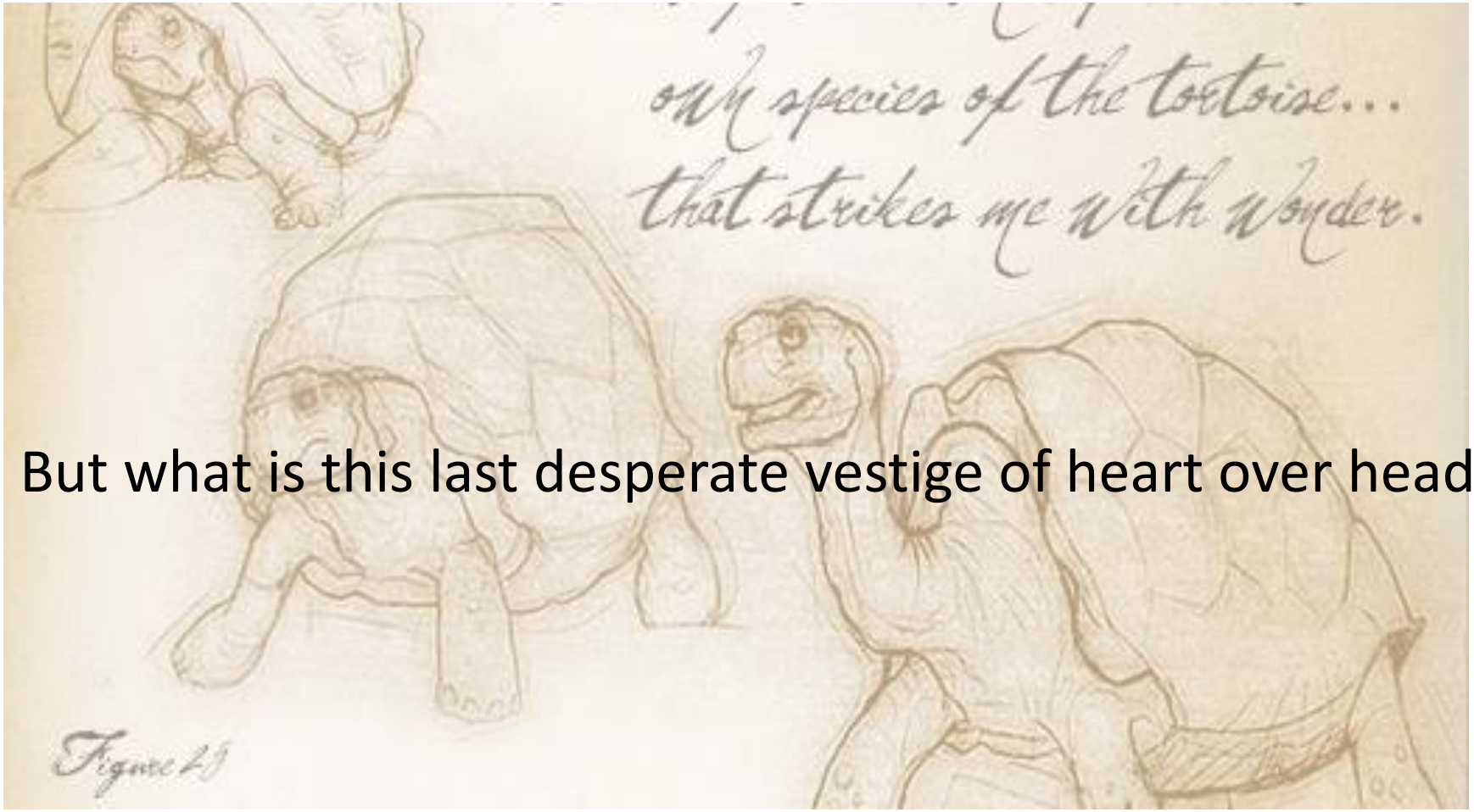
The Galapagos Tortoise

Notebooks and A-level Biology

Neil R. Ingram

neil.ingram@bristol.ac.uk

Notebooks and A-level Biology

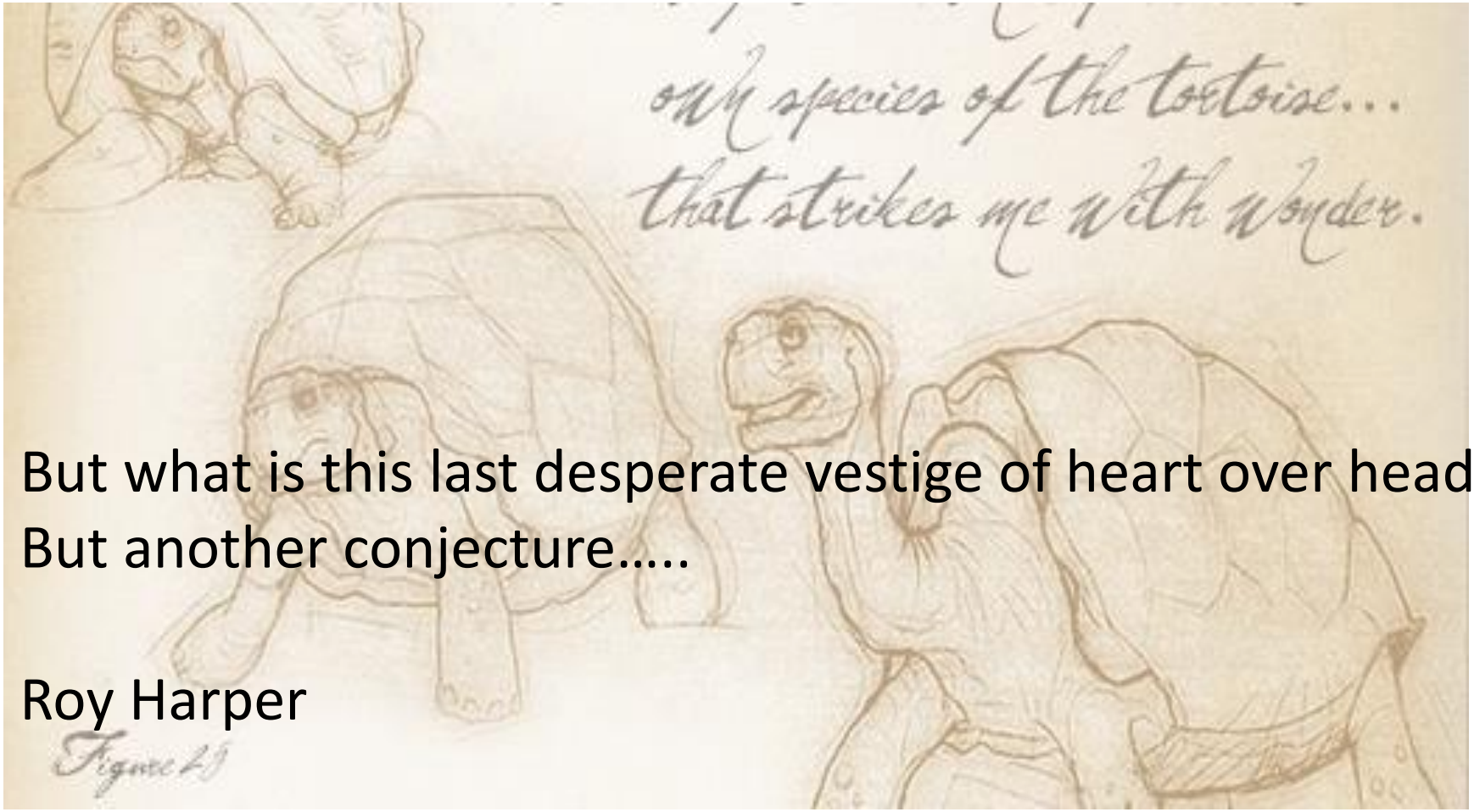


But what is this last desperate vestige of heart over head

Neil R. Ingram

neil.ingram@bristol.ac.uk

Notebooks and A-level Biology



But what is this last desperate vestige of heart over head
But another conjecture…..

Roy Harper

neil.ingram@bristol.ac.uk

Assessment is controversial

- “Exams too often “disempower” learners by failing to give them the chance to demonstrate their full range of knowledge and skills”.
- Assessments are too often based on “narrow concepts of achievement and performance”.

- Salzburg Global Seminar (December 2015)

Notebooks and A-level Biology

Neil R. Ingram

neil.ingram@bristol.ac.uk

Oxford and Cambridge, Biology A-level, June 1957

ADVANCED LEVEL

PAPER I

(Two hours and a half)

Answer **five** *questions.*

Candidates should give labelled diagrams where they make the answer clearer.

1. Show how the skin of a **named** fish and of a **named** mammal is adapted for the special conditions of aquatic and terrestrial life. Discuss the significance of their skin colour.

2. Green plants absorb nitrogen in the form of nitrates from the soil; green plants are eaten by animals; animals excrete nitrogen in the form of urine (or urea). Trace what happens in plants and animals during this part of the nitrogen cycle.

3. Buds occur on **annual** green plants and there are "buds" on *Hydra*. Give an account of the structure and function of each.

Oxford and Cambridge, Biology A-level, June 1957

4. Describe and compare the female reproductive organs of a frog and a **named** mammal. Give details of how the young of each animal are supplied with nutrients until they are able to feed independently.

5. Striped muscle fibres are found in mammals and xylem fibres are found in flowering plants. Describe, with the aid of diagrams, their structure and functions.

6. With the aid of diagrams, describe the structure and reproduction of *Mucor*. Compare its method of nutrition with that of any **named** parasitic fungus.

7. What do you understand by "alternation of generations"? Illustrate your answer by reference to a flowering plant, *Pellia* (or *Funaria*) and *Spirogyra*.

8. Describe **three** experiments from the results of which you can deduce the essential features of aerobic respiration in plants.

9. Write an essay on the control of disease in plants and animals.

Oxford and Cambridge, Biology A-level, June 1957

ADVANCED LEVEL

PAPER II

(Two hours and a half)

Answer **five** *questions.*

Candidates should give labelled diagrams where they make the answer clearer.

1. Define transpiration and translocation. How would you show experimentally, using potted plants, the effect of changes in external conditions upon transpiration?

2. To what do you attribute the biological success of insects?

3. "More animals are born than can possibly survive" (C. DARWIN). Discuss this statement in relation to the theory of natural selection.

4. Describe the life-histories of **two** animals and **two** plants found in any **one** habitat you have studied, and point out the ways in which the life-histories are adapted to the particular environment.

5. Describe the blood vascular system carrying blood to and from the liver of a **named** mammal, and compare the composition of the blood in the vessels you have named.

6. By means of labelled diagrams, show the structure of the stem of a woody plant. How is the structure correlated with the functions of the stem?

7. Describe the female reproductive organs of a **named** flower. Show with the aid of diagrams what happens to these organs from the time of pollination until the seed leaves the plant.

8. Compare and contrast the ways in which animals and plants respond to the stimulus of light.

9. Why are chemical fertilisers used on agricultural land? What particularly valuable properties does the dung of domestic animals have as manure?

Oxford and Cambridge, Biology A-level, Practical paper, June 1957

ADVANCED LEVEL

PRACTICAL TEST

(Three hours)

The examiners expect candidates to spend on each question approximately the time indicated in brackets at the end of the question.

All drawings must be made on plain paper and, if possible, the answers should be tied up in the set order.

1. Dissect the frog provided, **K1**, to display (*a*) the alimentary canal, (*b*) the glands associated with the alimentary canal, (*c*) the hepatic portal system. Proceed as follows:

(i) Pin out the frog, ventral side uppermost, on the cork provided and open the body cavity under water.

Oxford and Cambridge, Biology A-level, Practical paper, June 1957

(ii) Remove the median portion of the pectoral girdle, and in the case of the female remove also the ovaries and oviducts.

(iii) Displace the lobes of the liver, the stomach and the small intestine, holding them in position by suitably placed pins, so that the hepatic portal system may be traced and displayed.

Make an accurate drawing of your dissection, labelling the organs and the veins of the hepatic portal system displayed.

(75 minutes.)

Oxford and Cambridge, Biology A-level, Practical paper, June 1957

Dispatch of Dissections and Return of Specimens

A label bearing the candidate's number in pencil (not indelible) must be firmly fixed with string to the actual dissection. Each dissection is to be covered with a pad of cotton wool soaked in 2% formalin and then wrapped in waxed paper (wrappings from packets of breakfast cereals are excellent). The dissections, together with all slides and specimens, are to be returned to Cambridge in the containers in which they were sent to the school. Addressed labels are provided and the box(es) containing the dissections and specimens must be clearly marked on the outside with the centre number and name of the school. **If this is not done, sorting is made very difficult and schools may not be credited with having returned their specimens. Specimens not returned in good condition will be charged to the school.**

2. You are provided with (*a*) 0·5% starch solution, (*b*) solution **K 2**. Carry out the following instructions and tabulate your results.

(i) Make up the contents of three test-tubes as follows:

Tube 1. 10 c.c. starch solution.

Tube 2. 10 c.c. starch solution, 5 c.c. solution **K 2**.

Tube 3. 10 c.c. starch solution, 5 c.c. solution **K 2** which has been previously boiled for about one minute.

(ii) Place the three test-tubes in a beaker of water maintained at approximately 35–40° C. and leave them there while performing the remaining tests.

(iii) After one minute test the contents of each tube with iodine solution and continue testing at one-minute intervals, for a period of 15 minutes. [These tests may be done conveniently by placing a series of drops of iodine solution on a white tile, and adding to them a drop of liquid from each tube in turn.]

(iv) Finally, test the contents of each tube with Fehling's solution.

Give a concise explanation of your results, suggesting the identity of solution **K 2**. (50 minutes.)

Oxford and Cambridge, Biology A-level, Practical paper, June 1957

3. Cut transverse sections of specimen **K 3**, stain selected sections to differentiate the lignified tissues, and mount them temporarily for microscopic examination.

Make an accurate labelled plan diagram to show the disposition of the tissues in a complete section. (55 minutes.)

Notebooks and A-level Biology

Neil R. Ingram

neil.ingram@bristol.ac.uk

The Ofqual view

The watchdog attracted criticism last year for its decision to stop counting an assessment of practical work towards students' final grades in science GCSEs and A-levels. But Ms Stacey today stood by her decision, saying the assessments had become “stultifying”.

“I think there’s absolute recognition that it wasn’t working, it was knocking the fun out of science and our interest was getting more practical science,” she said. “We were not able to square that with assessment at the end.”

The new A-level Biology

	Assessment Objective
AO1	Demonstrate knowledge and understanding of scientific ideas, processes, techniques and procedures.
AO2	Apply knowledge and understanding of scientific ideas, processes, techniques and procedures: • in a theoretical context • in a practical context • when handling qualitative data • when handling quantitative data.
AO3	Analyse, interpret and evaluate scientific information, ideas and evidence, including in relation to issues, to: • make judgements and reach conclusions • develop and refine practical design and procedures.

Mathematical requirements

Within A Level in Biology, 10% of the marks available within written examinations will be for assessment of mathematics (in the context of biology) at a Level 2 standard, or higher. Lower level mathematical skills will still be assessed within examination papers but will not count within the 10% weighting for biology.

The following will be counted as Level 2 (or higher) mathematics:

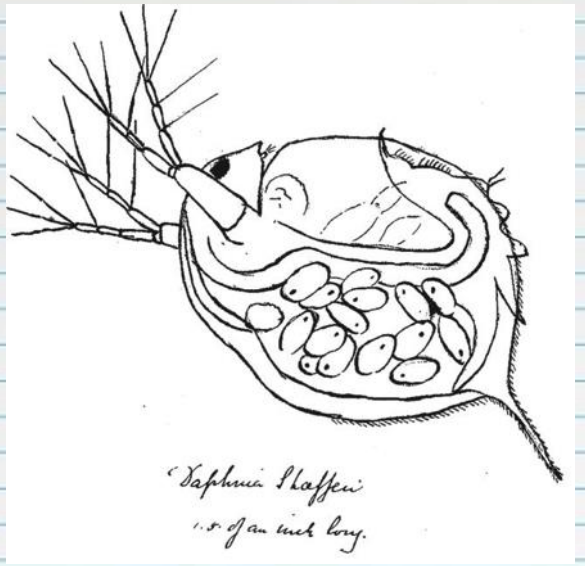
- application and understanding requiring choice of data or equation to be used
- problem solving involving use of mathematics from different areas of maths and decisions about direction to proceed
- questions involving use of A level mathematical content (as of 2012), e.g. use of logarithmic equations.

The following will <u>not</u> be counted as Level 2 mathematics:

- simple substitution with little choice of equation or data
- structured question formats using GCSE mathematics (based on 2012 GCSE mathematics content).

Additional guidance on the assessment of mathematics within biology is available on the OCR website as a separate resource, the Maths Skills Handbook.

Rediscovering the practical notebook



This was drawn by John Lubbock in his notebook.

Lubbock was a friend and collaborator with Charles Darwin.

a) Correctly follows written instructions to carry out experimental techniques or procedures

a) Correctly uses appropriate instrumentation, apparatus and materials (including ICT) to carry out investigative activities, experimental techniques and procedures with minimal assistance or prompting.

...ons to carry out
...ures

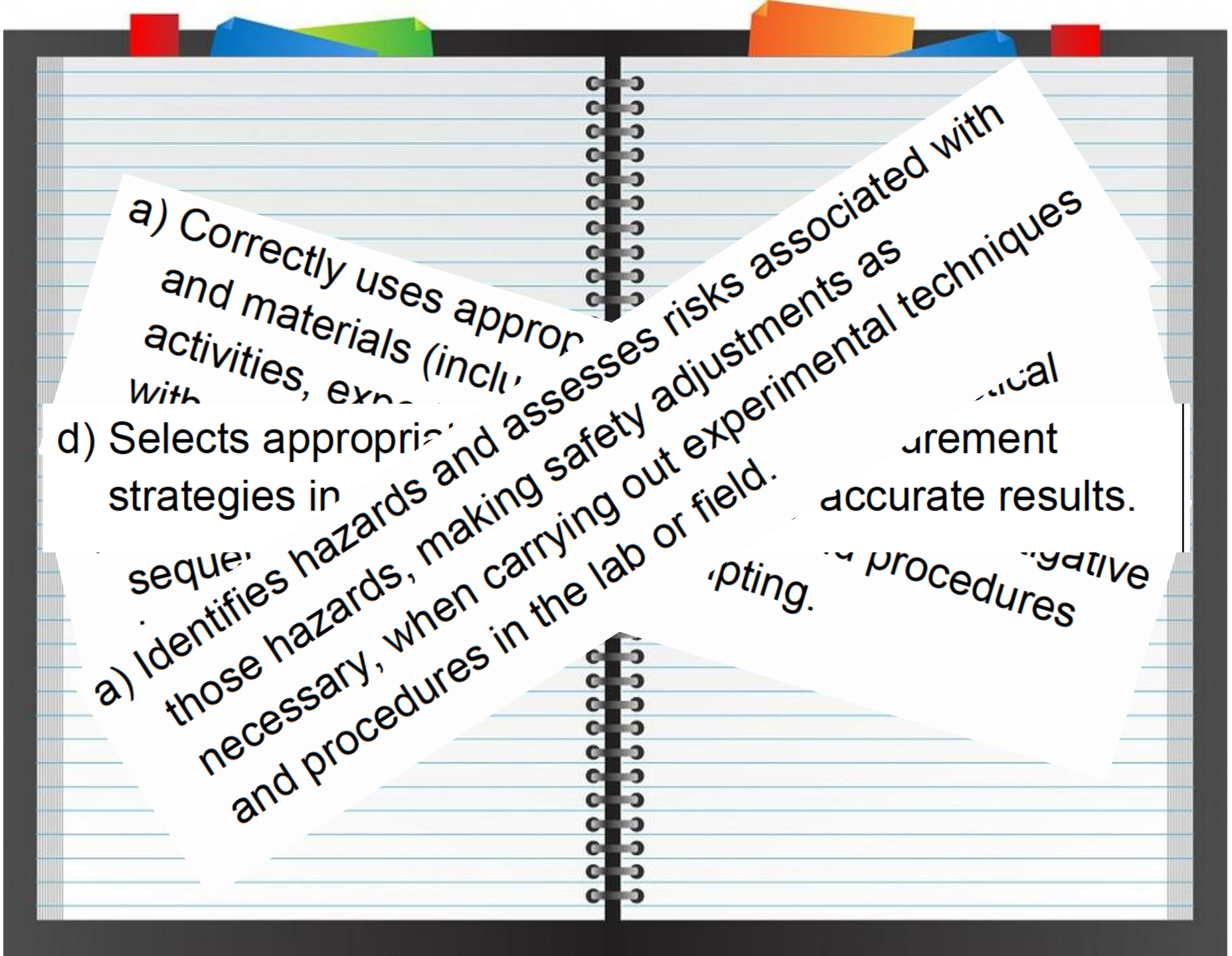
a) Correctly fol...
experimental te...

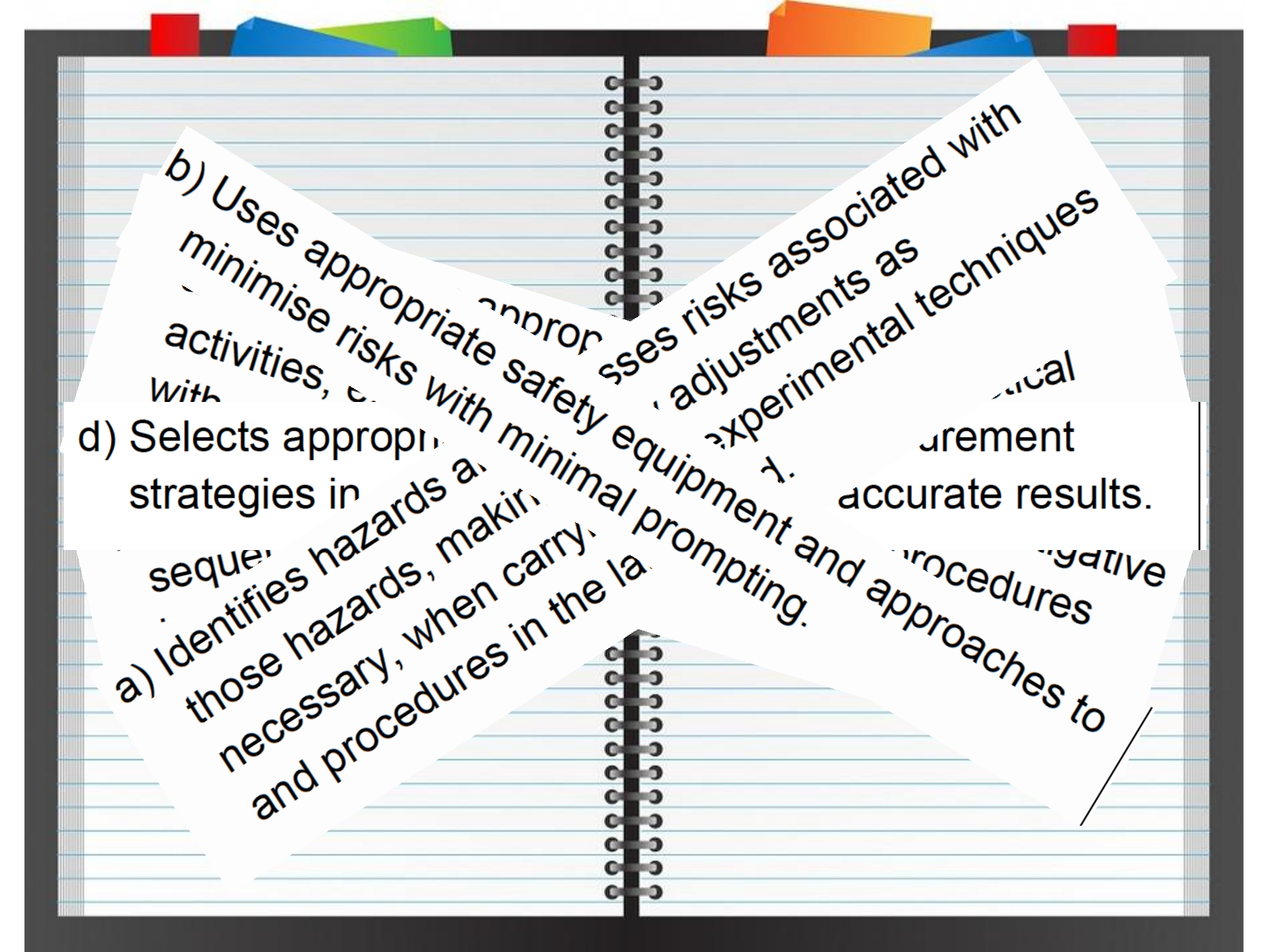
a) Correctly uses appropriate ions to carry out
and materials (includi
activities, experi
with minima

b) Carries out techniques or procedures methodically, in
sequence and in combination, identifying practical
issues and making adjustments where necessary.
apparatus
t investigative
and procedures
ompting.

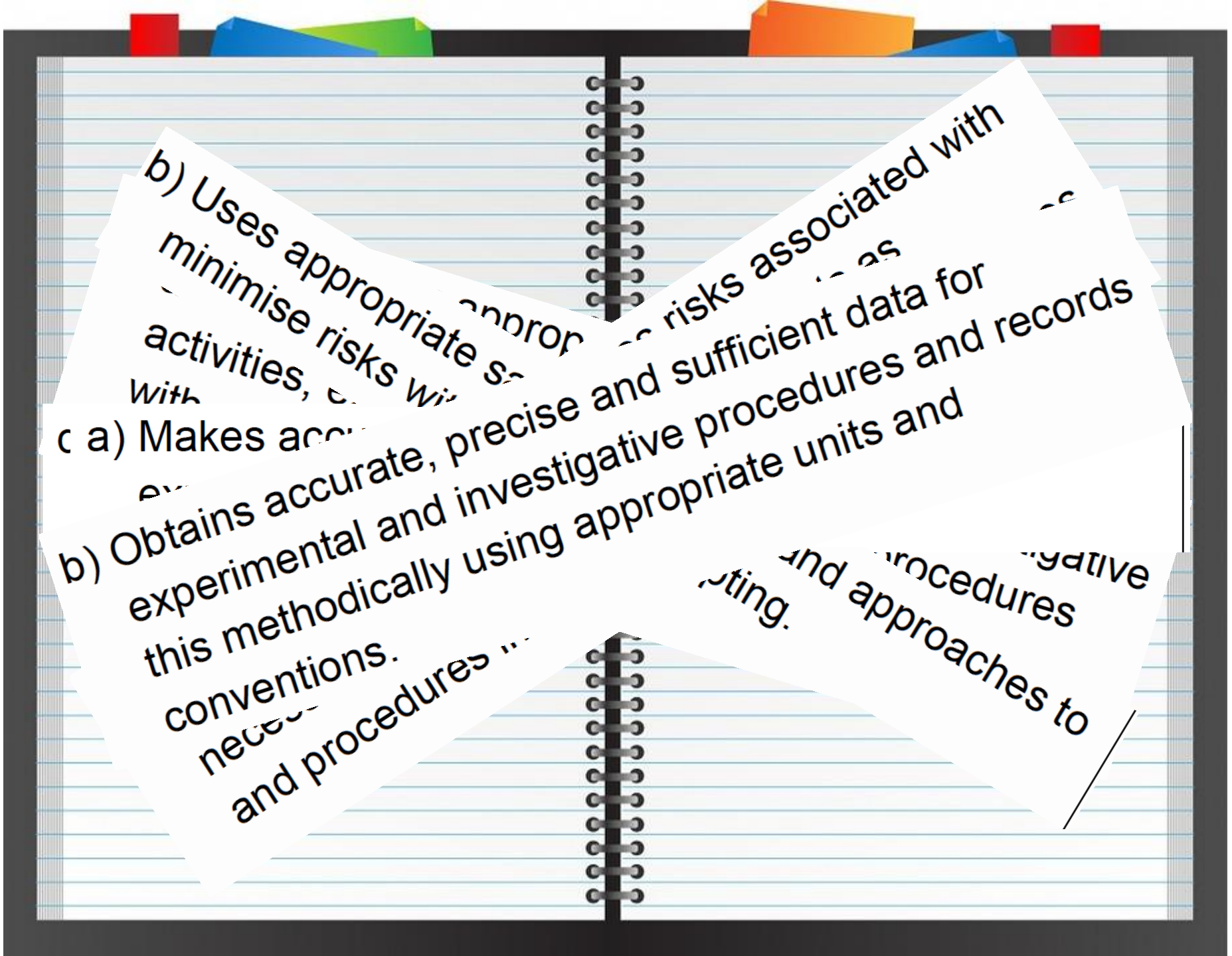
a) Cor
experimenta

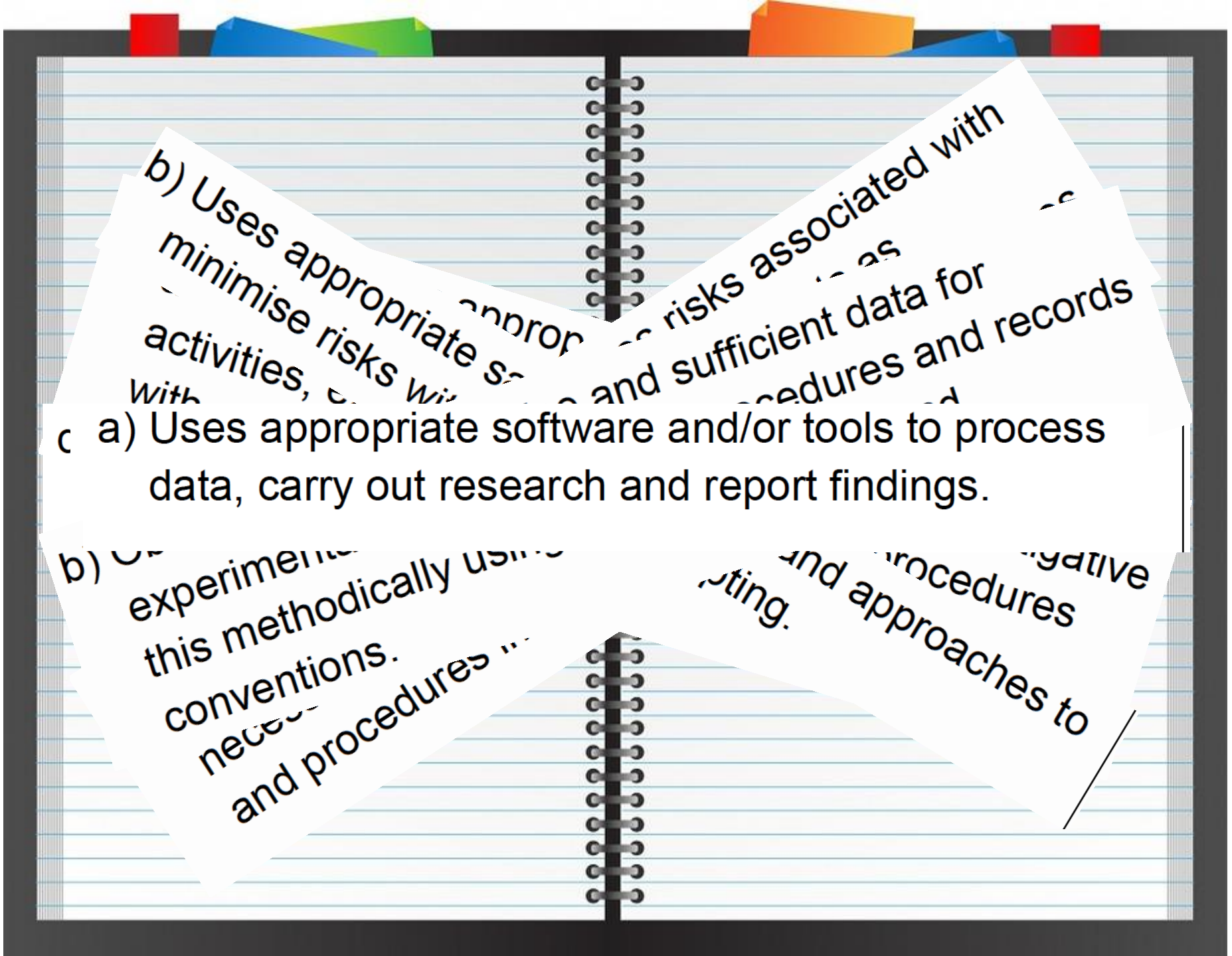
d) Selects appropriate equipment and measurement strategies in order to ensure suitably accurate results.

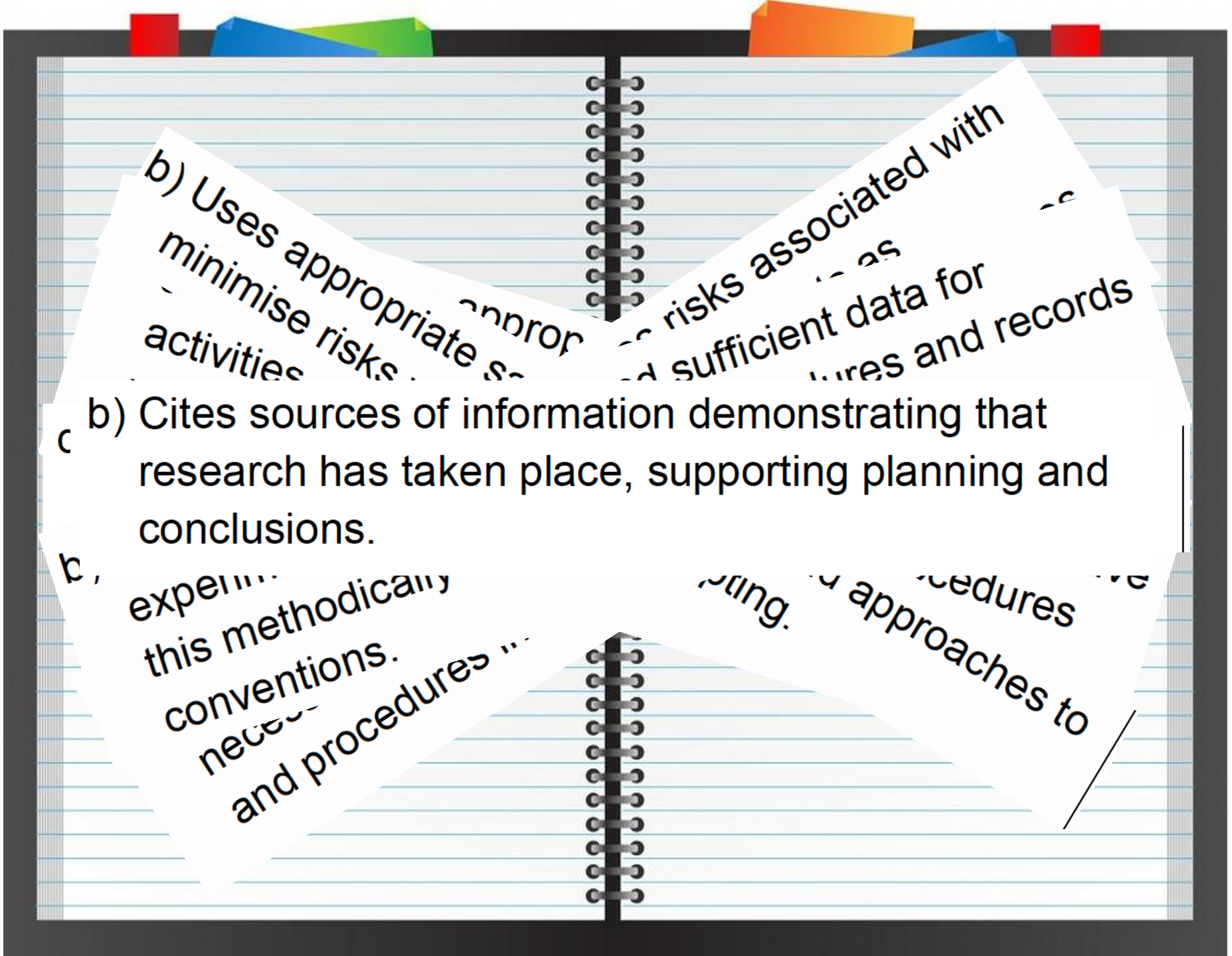

a) Correctly uses appro
and materials (inclu
activities, exp
With
d) Selects appropri
strategies in
seque
a) Identifies hazards and assesses risks associated with
those hazards, making safety adjustments as
necessary, when carrying out experimental techniques
and procedures in the lab or field.
ical
urement
accurate results.
pting.
procedures

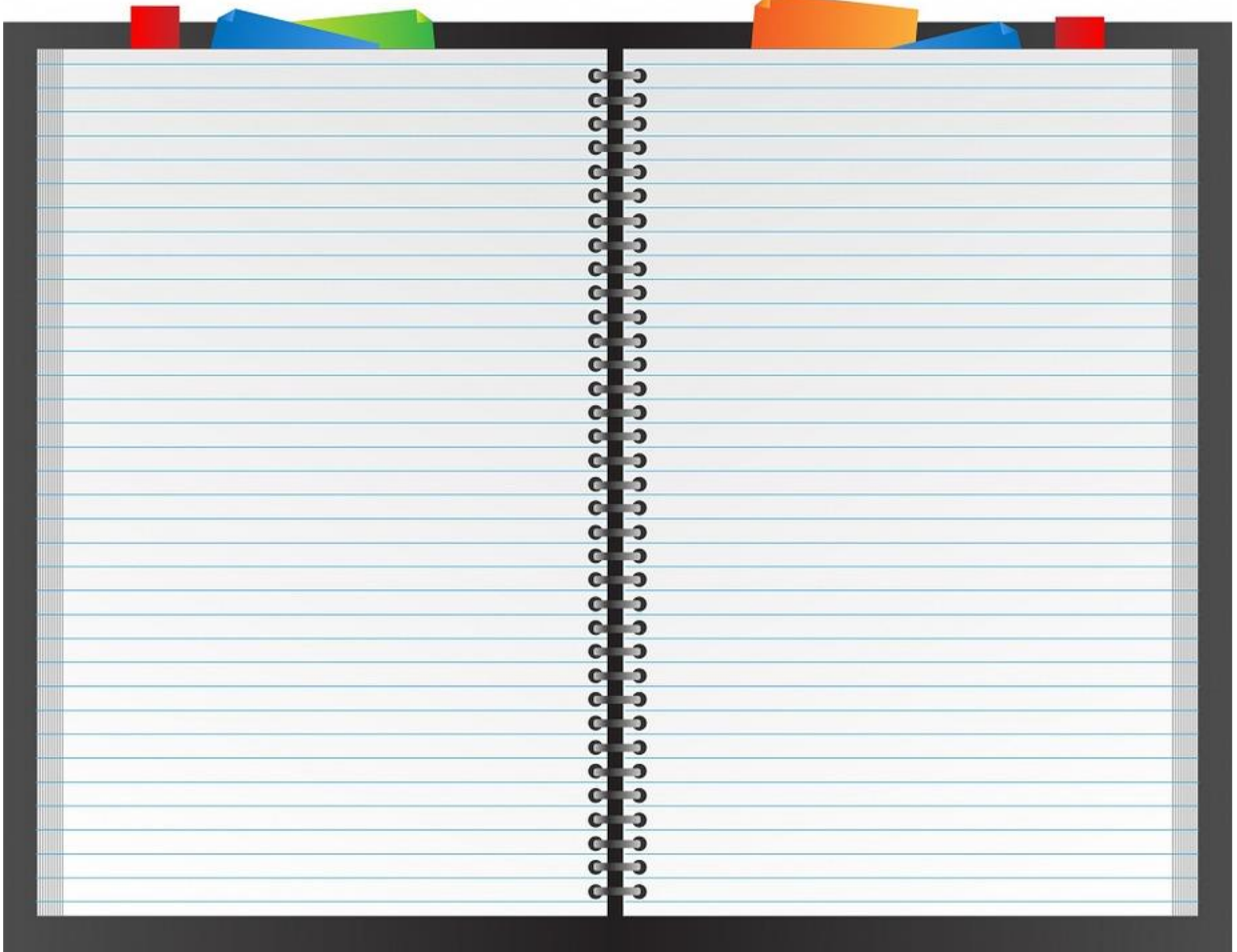

b) Uses appropriate safety equipment and approaches to
minimise risks with minimal prompting.
activities,
d) Selects appropr
strategies in
a) Identifies hazards a
those hazards, makir
necessary, when carry
and procedures in the la
sses risks associated with
adjustments as
experimental techniques
rement
accurate results.
rocedures

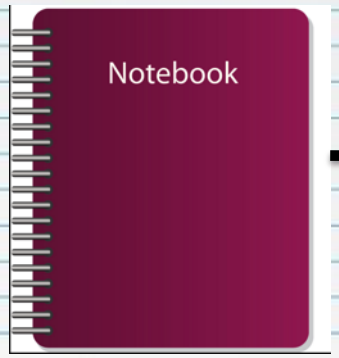
c a) Makes accurate observations relevant to the experimental or investigative procedure.


b) Uses appropriate
minimise risks
activities,
c a) Makes
b) Obtains accurate, precise and sufficient data for
experimental and investigative procedures and records
this methodically using appropriate units and
conventions.
and procedures
risks associated with
and approaches to


a) Uses appropriate software and/or tools to process data, carry out research and report findings.

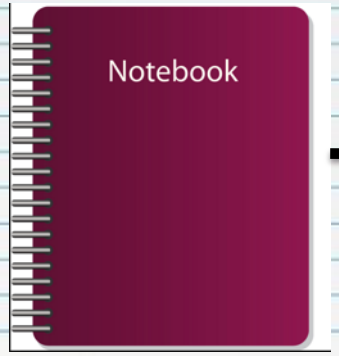

b) Uses appropriate
minimise risks
activities
risks associated with
sufficient data for
ures and records
b) Cites sources of information demonstrating that research has taken place, supporting planning and conclusions.
this methodically
conventions.
and procedures
approaches to



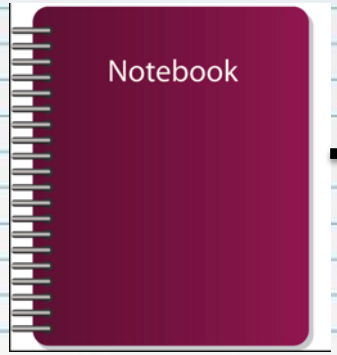

Notebook


Certificate of Completion
This certificate is awarded to
for successful completion of
practical science
Ofqual
Glenys Stacey
To learn beyond your first hour, visit Code.org
GREAT WORK
KEEP LEARNING

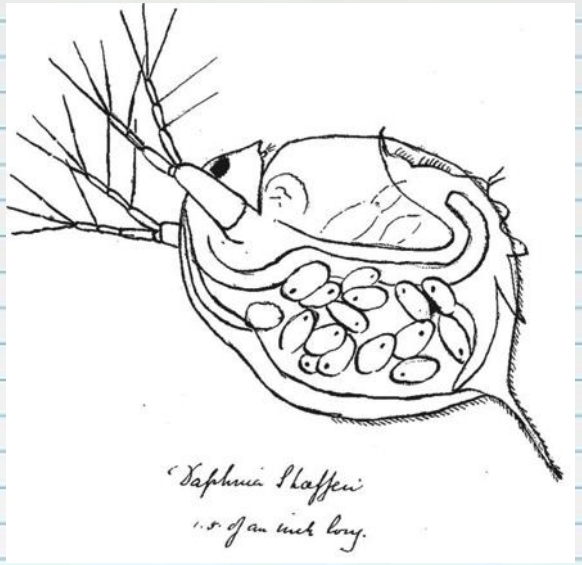
Mission Creep



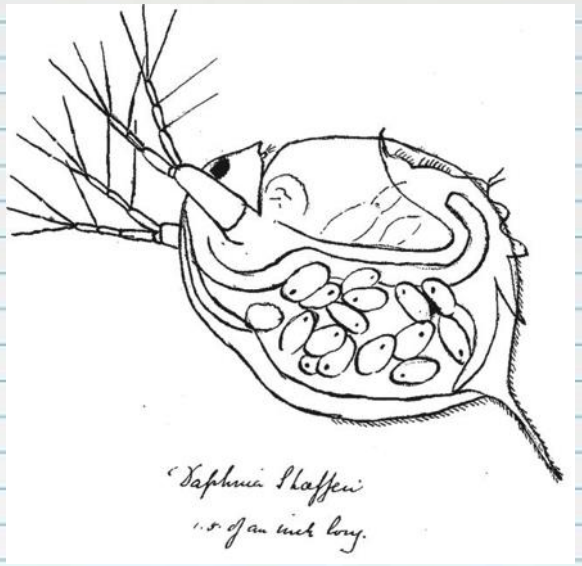
Mission Creep



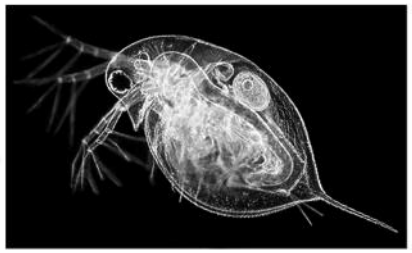
formalised,
controlled assessments
of individual performance



33% practical questions in A-level biology



4. *Daphnia* (water fleas) can be used to determine the effect of chemicals on heart rate.



(a) (i) Explain **one** reason why *Daphnia* is a suitable organism for this experiment.

.....

.....

(1)

(ii) An experiment was carried out to investigate the effect of caffeine on the heart rate of *Daphnia*. State **two** variables that you would need to control to produce reliable results.

33% practical questions in A-level biology

Assessment is controversial

- “Exams too often “disempower” learners by failing to give them the chance to demonstrate their full range of knowledge and skills”.
- Assessments are too often based on “narrow concepts of achievement and performance”.

- Salzburg Global Seminar (December 2015)

Assessment is controversial

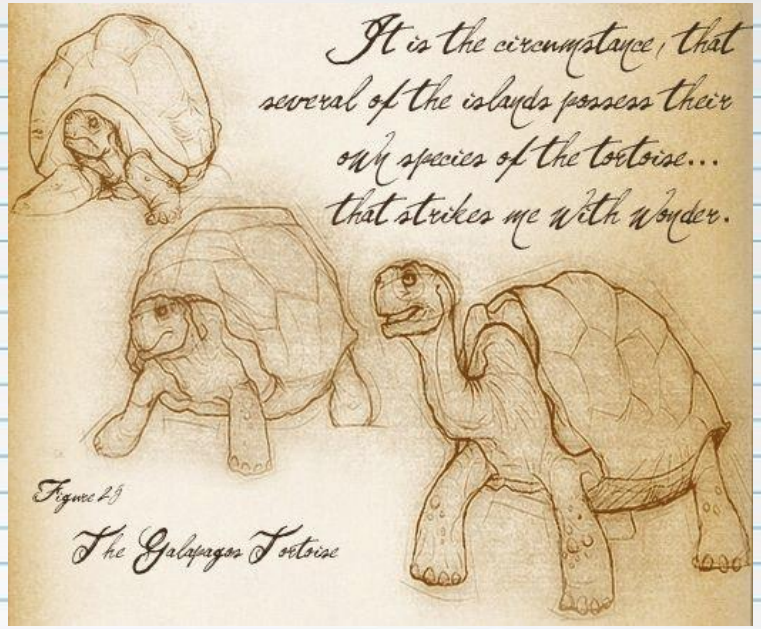
- interpersonal engagement,
- relationship enrichment,
- task completion,
- intellectual engagement
- emotional regulation.

- Salzburg Global Seminar (December 2015)

EXCLUSIVE: New Pisa teamwork test will be game-changer, Schleicher predicts

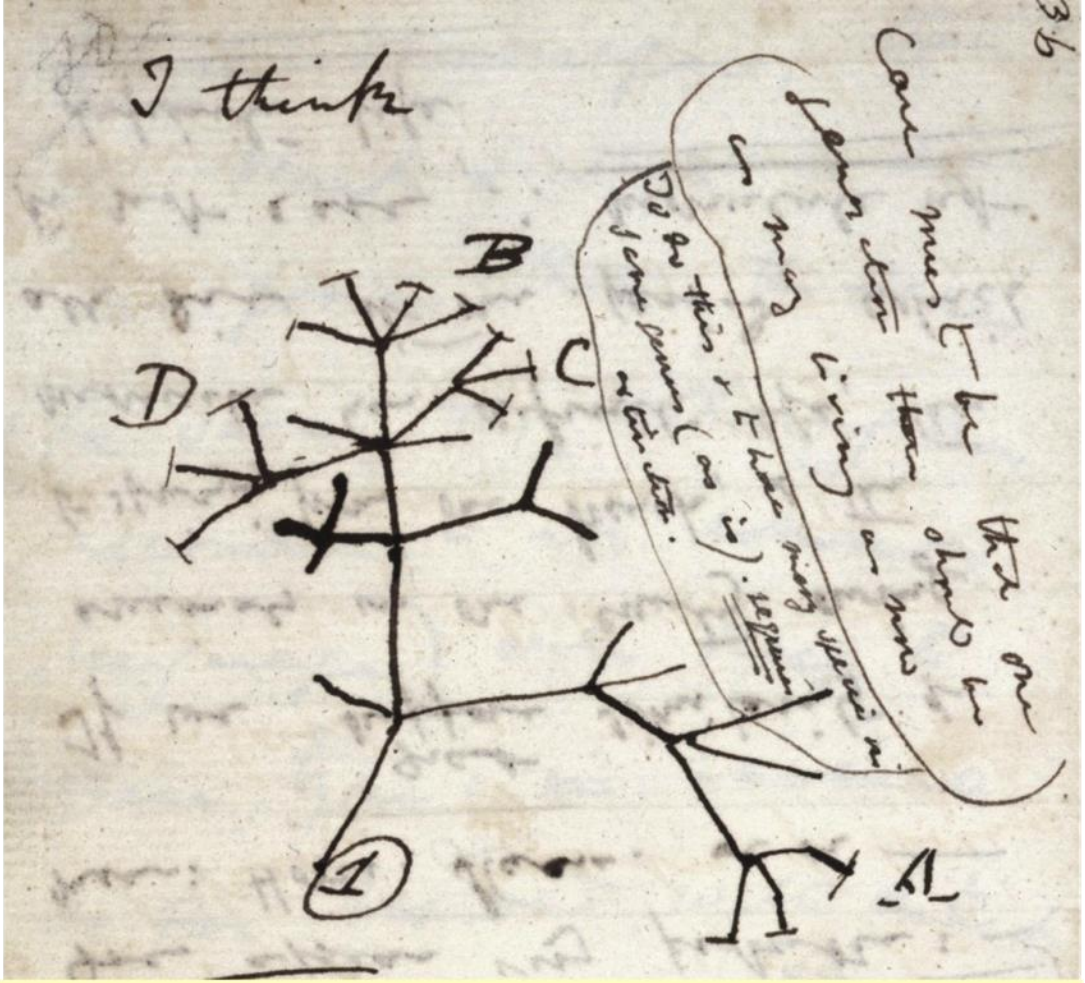
Helen Ward

31st December 2015 at 08:00



Charles Darwin's notebooks

http://darwin-online.org.uk/

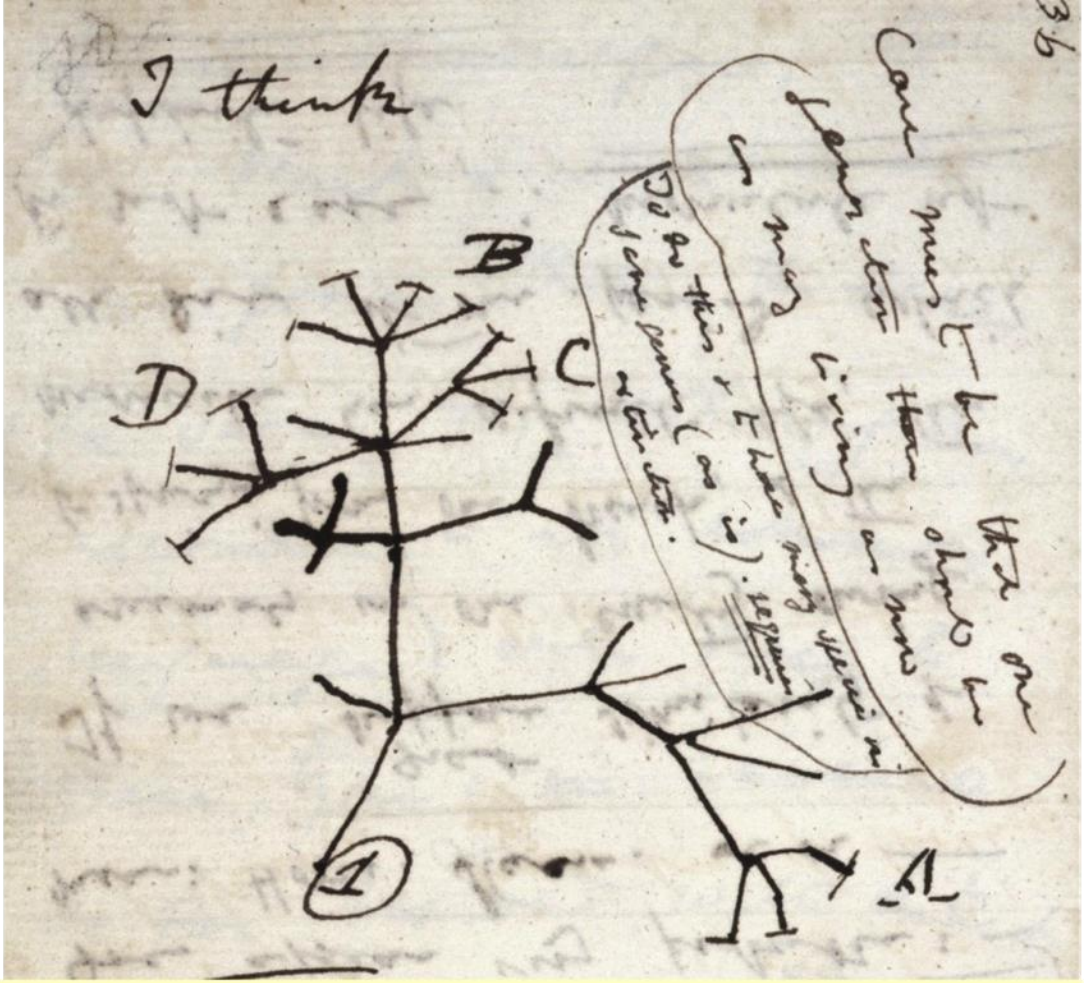


I think

[sketch]

Case must be that one generation then should be as many living as now. To do this & to have many species in same genus (as is) requires extinction.

A place to think

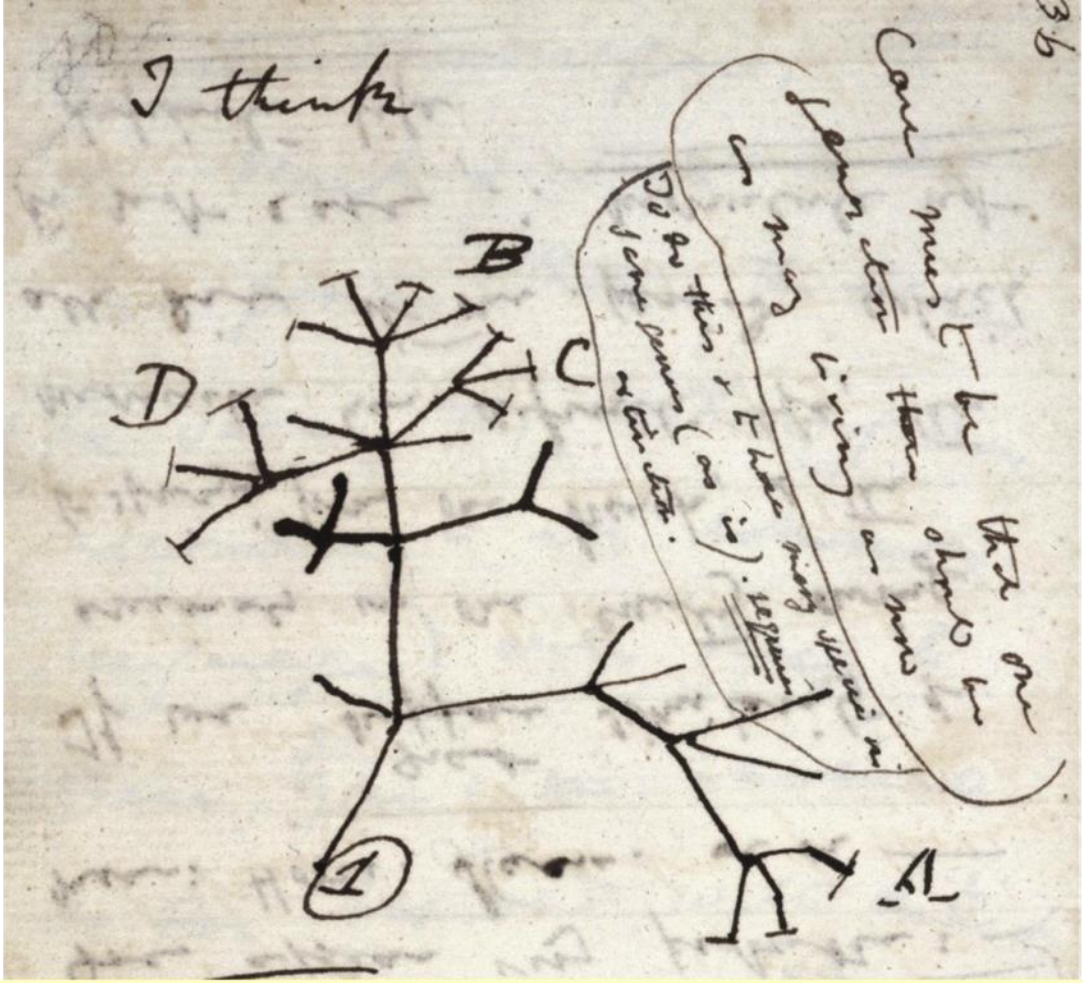


I think

[sketch]

Case must be that one generation then should be as many living as now. To do this & to have many species in same genus (as is) requires extinction.

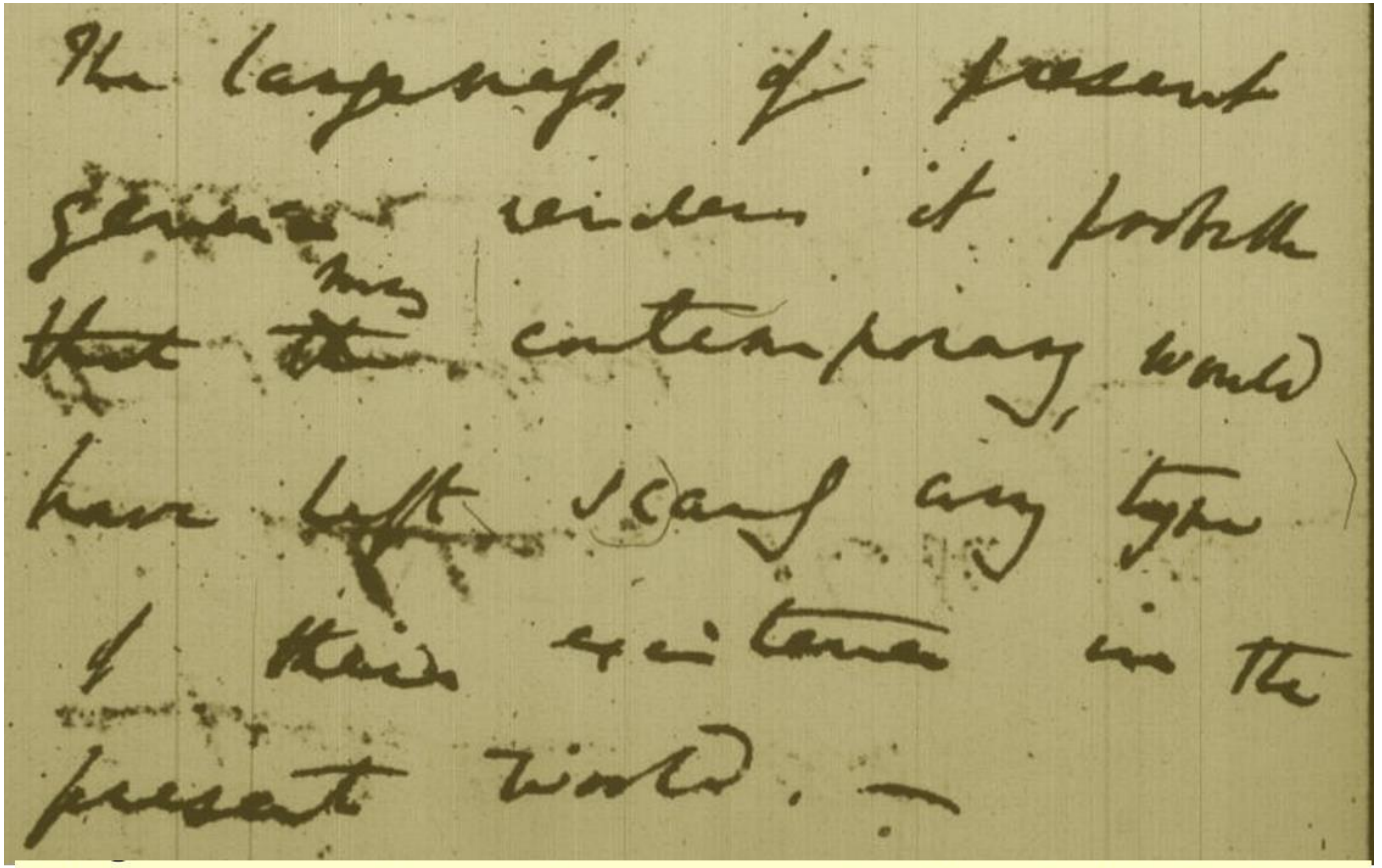
A place to think,
to doodle,
to underline



I think

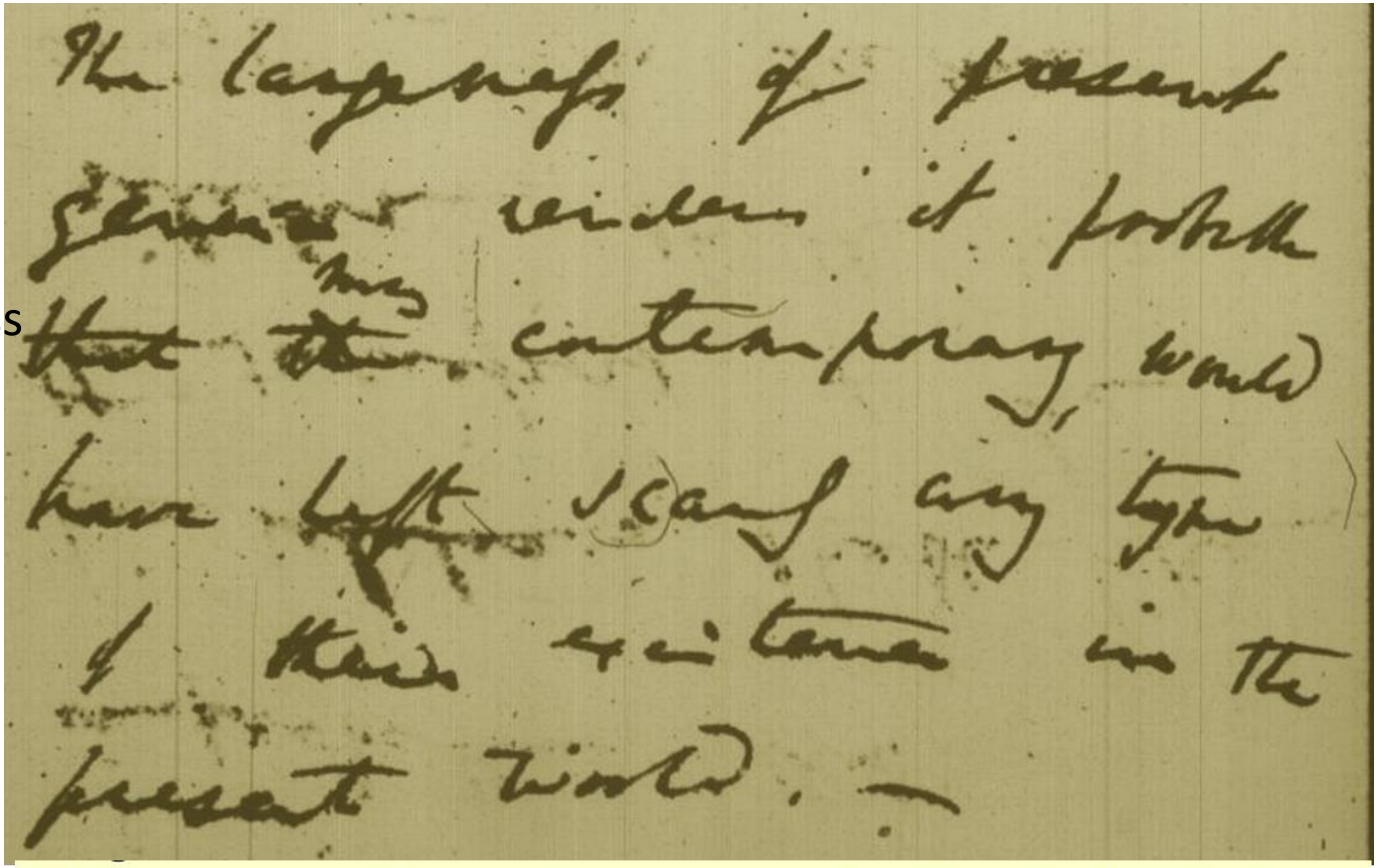
[sketch]

Case must be that one generation then should be as many living as now. To do this & to have many species in same genus (as is) requires extinction.



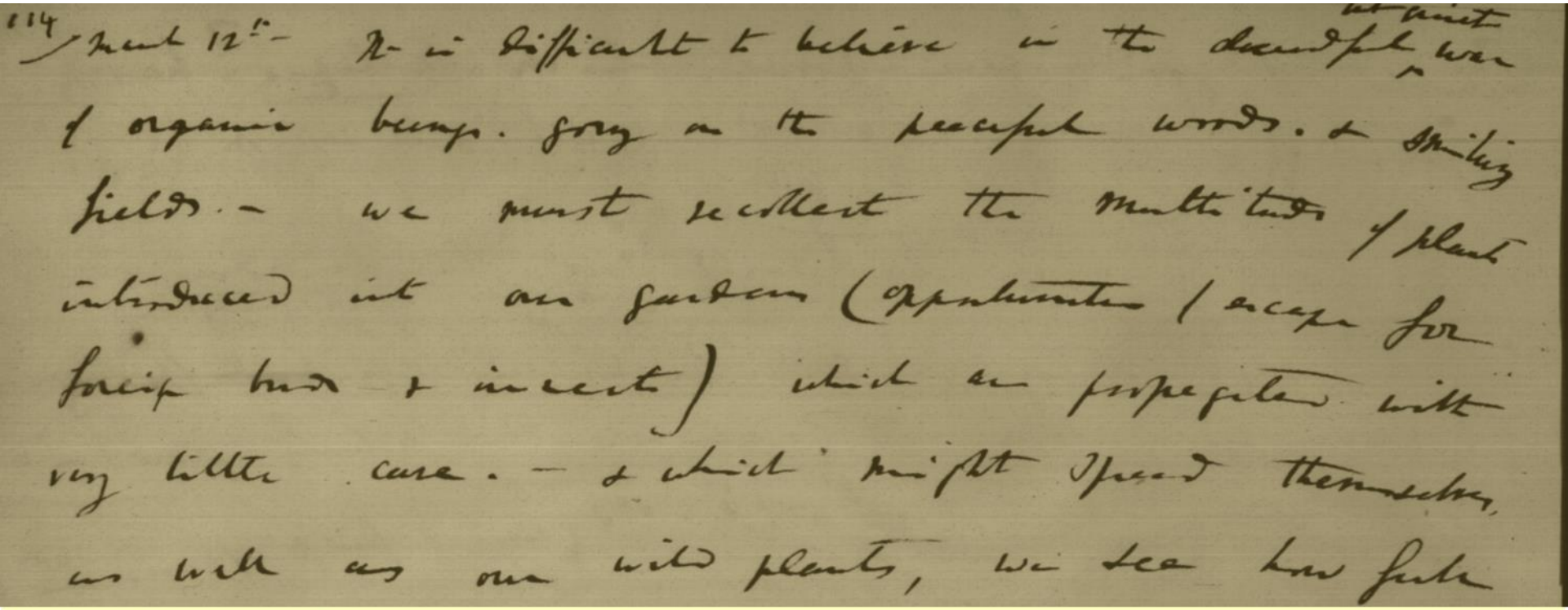
The largeness of present genera renders it probable that ~~the~~ many contemporary, would have left scarcely any types of their existence in the present world. — or we may suppose only each species in each generation only breeds; <u>like</u> individuals in a country not rapidly increasing. —

A place to cross things out



The largeness of present genera renders it probable that ~~the~~ many contemporary, would have left scarcely any types of their existence in the present world. — or we may suppose only each species in each generation only breeds; <u>like</u> individuals in a country not rapidly increasing. —

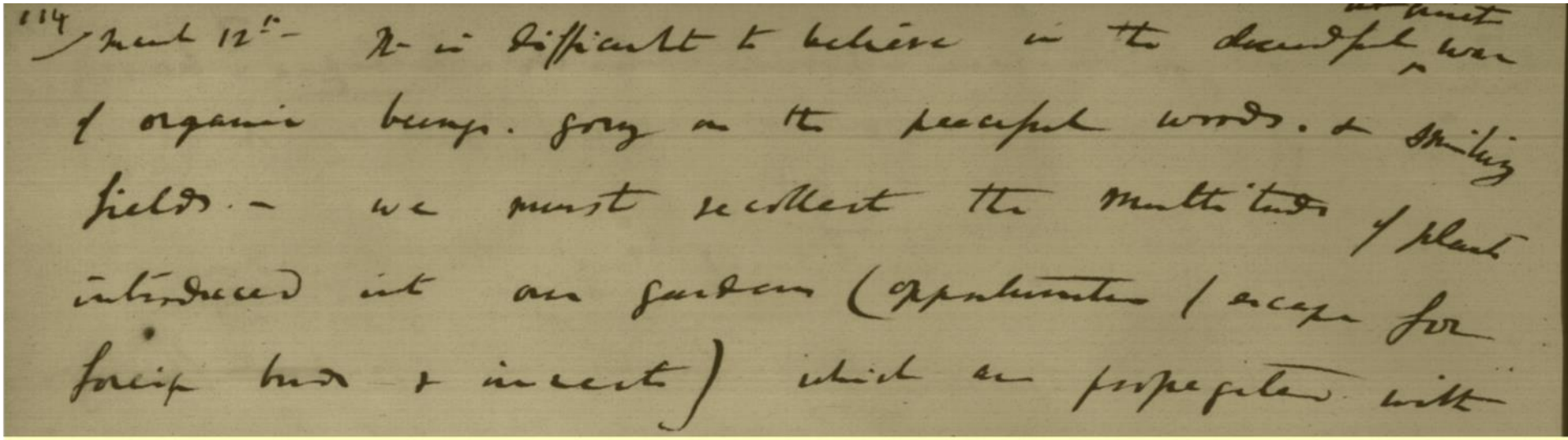
A place to collaborate with others, to make notes



March 6th. Mr Bentham[1] says in Sandwich Isld he believes there are many cases of genera peculiar to the group having species peculiar to the separate islands. In his work on the Labiatae some of these species are described. — capital case. — for Sandwich Isld are very similar to Galapagos — study Flora, what general forms. — are the Labiatae nearest to American or Indian groups? = Believe some Mediterranean, but chiefly mountainous — this is very important (Sicily exception) — see if this can be generalized — islds have peculiar

[1] George Bentham, Labiatarum genera et species, London, 1832-6.

A place to rehearse important ideas



March 12th It is difficult to believe in the dreadful but quiet war of organic beings. going on the peaceful woods. & smiling fields. — we must recollect the multitude of plants introduced into our gardens (opportunities of escape for foreign buds & insects) which are propagated with very little care, — & which might spread themselves as well as our wild plants, we see how full nature, how finely each holds its place. — When we hear from authors (Ramond[1] Hort. Tranact. vol. I, p. 17 Append) that in the Pyrenees that the

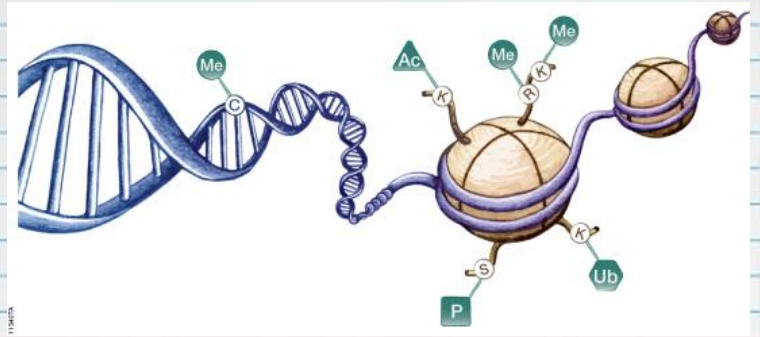
It is interesting to contemplate a tangled bank, clothed with many plants of many kinds, with birds singing on the bushes, with various insects flitting about, and with worms crawling through the damp earth, and to reflect that these elaborately constructed forms, so different from each other, and dependent upon each other in so complex a manner, have all been produced by laws acting around us….

Thus, from the war of nature, from famine and death, the most exalted object which we are capable of conceiving, namely, the production of the higher animals, directly follows.

There is grandeur in this view of life, with its several powers, having been originally breathed by the Creator into a few forms or into one;
and that, whilst this planet has gone cycling on according to the fixed law of gravity, from so simple a beginning endless forms most beautiful and most wonderful have been, and are being evolved.

Charles Darwin
On the Origin of Species (1859)

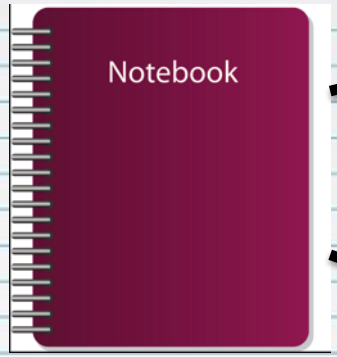
New ways of thinking



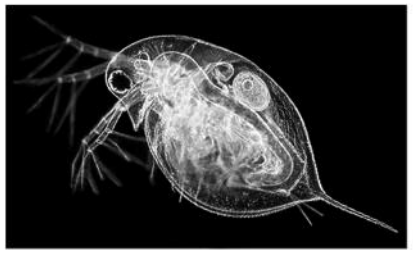
For 21st century biology and

21st century skills

Summative notebook



4. *Daphnia* (water fleas) can be used to determine the effect of chemicals on heart rate.



(a) (i) Explain **one** reason why *Daphnia* is a suitable organism for this experiment.

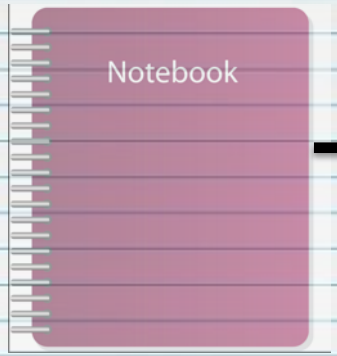
.....

.....

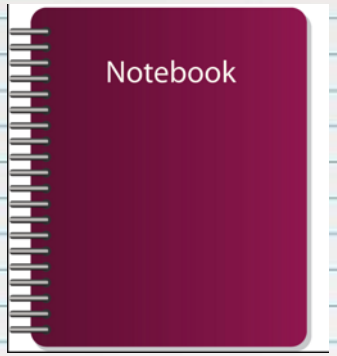
(1)

(ii) An experiment was carried out to investigate the effect of caffeine on the heart rate of *Daphnia*. State **two** variables that you would need to control to produce reliable results.

Formative
e-notebook



Summative
notebook



edmodo

OneNote

Re-imagining practical notebooks for A-level Biology

Neil R. Ingram

neil.ingram@bristol.ac.uk