

RSB response to OCR consultation on a new Natural History GCSE

<https://teach.ocr.org.uk/gcse-natural-history-consultation-launch-event>

<https://teach.ocr.org.uk/naturalhistory>

July 2020

Exam board OCR launched a consultation in June 2020 detailing proposals for a new Natural History GCSE with a principle aim of re-engaging students with the natural world, asking students to carry out field work and analyse how the natural world has been represented in art and literature. In order to inform this response, the education policy team consulted with RSB's Education and Science Policy Committee, Animal Science Group, Biology Education Research Group, Curriculum Committee, Education Policy Advisory Group, UK Plant Sciences Federation. Prior to this consultation phase the Society has taken part in informal discussions with OCR about their plans for developing a Natural History GCSE and alternative routes that could be taken.

1. I am happy for my anonymised feedback to be shared in future customer facing messaging

Yes	No
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2. If you are happy to proceed, please give your consent to participate

Yes	No
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3. Are you currently in school / full time education, and aged 18 years or younger?

Yes	No
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Please read the following proposed definition of 'natural history'.

'Natural History focuses on understanding the rich and diverse natural world. Through observational study (generating systematic records of direct and indirect observations, often made over long periods of time) and investigation, natural history seeks to understand the diversity, complexities, and interconnectedness of life on Earth in contrasting habitats. Natural history explores how our natural world has been shaped, and how it continues to change, both by natural processes and through human intervention'

4. To what extent do you agree or disagree with the definition we have provided above?

Strongly Disagree	Disagree	Neither Agree or Disagree	Agree	Strongly Agree
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5. Is there anything that you would add or remove from the definition given above?

The Society welcomes the drive to increase interest and engagement in the natural world, and to cultivate love and respect for Nature.

The Royal Society of Biology

- supports the goal of developing secondary school students' understanding of, and engagement with, natural history and wider environmental themes
- welcomes OCR's exploration of ways in which this could be achieved
- questions whether a new GCSE in Natural History is the best way to achieve this.

We expand on these positions throughout this formal consultation response, and in a letter to Jill Duffy Chief Executive of OCR submitted in parallel with this response.

We note that the proposed definition of natural history is broad, but the content that follows in the consultation is much narrower with a tendency to focus on ecology and environmental management, and does not pick up on neo-Darwinism. We are pleased to see the emphasis on studying the impact of human intervention, both positive and negative. The definition should also explain what is meant by biological conservation, including in situ and ex situ conservation work and involvement of local communities and refer to the impact of current actions (or lack of) on the future.

Please read the following statement about the purpose of studying a GCSE in Natural History:

'Natural history offers a unique opportunity to observe and engage with the natural world to develop a deeper understanding of the flora and fauna (life on Earth) within it. It is a study of how the natural world has been shaped and has evolved as well as how humans (as part of that natural world) influence, conserve and protect it. It is vital that we continue to develop our understanding of the natural world in order to safeguard the future.'

To fully appreciate the complexities of the natural world it is important to study it closely and interact with it through field research and measurement. Natural history provides opportunities to develop skills out in the field as well as in a classroom and/or laboratory. Studying natural history makes an important contribution to understanding the relationship between the natural world and culture, policy decisions, scientific research and technology.'

Study of science, geography, history and the arts at key stages 3 and 4 provides a variety of complementary skills and knowledge which support the study of Natural history. This subject supports the development of unique skills and knowledge which give a sharper focus and depth to the complexities of the natural world. The progression pathway for this subject at key stage 5 and beyond could be scientific, geographical, environmental, ecological or natural history itself.'

6. To what extent do you agree with the purpose described above?

Strongly Disagree	Disagree	Neither Agree or Disagree	Agree	Strongly Agree
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7. What other purpose/s might a GCSE in Natural History serve?

The Royal Society of Biology strongly agrees that continuing to develop our understanding, appreciation and recognition of the value of the natural world is necessary in order to engage with the present and safeguard the future, and that studies in the field as well as in the classroom are important in understanding the relationship between the natural world, scientific thinking and reasoning, and applications and impacts of biological knowledge.

On the purpose of a Natural History GCSE:

This purpose statement could be improved by including the benefits to the individual of studying natural history, animal and plant life, and human – non-human organism relationships. It is important to include how art, literature and other cultural enterprise have affected understanding, but note that specification space in a GCSE is limited.

The Royal Society of Biology questions the final two sentences in the statement – the National Curriculum statements covering Biology and GCSEs in Combined Science and Biology cover many of the skills listed in the proposal, and disagree that they would be unique to the study of natural history. We also query the progression pathway – geographical, environmental, ecological and natural history studies are all scientific studies, and students wishing to progress into these subjects in further or higher education are well placed to do so through the existing routes at GCSE and A level.

RSB position on themes within the proposed GCSE:

The Society welcomes initiatives that aim to increase engagement with the natural world and encourage the enthusiasm to develop more of an emphasis on observation and investigation of the natural world and understanding of how humans have, and continue to, impact the natural world. However, this should be a goal for all students through compulsory science routes up to 16. We are not convinced that a new GCSE in Natural History is the most appropriate and effective route to achieve this. We would be happy to discuss alternative ideas, such as strengthening natural history themes in existing specifications, national curriculum and in future curriculum reforms, and alternative places for such content, for example a post-16 T level or general qualification or school-wide resources throughout the key stages.

Concerns about the proposed GCSE:

The Royal Society of Biology has mapped the proposed themes in the current Natural History GCSE proposal against the current specifications at GCSE and A level, and has identified significant overlap. Many of our members, including teachers, education researchers, and assessment experts, are concerned that a new GCSE risks detracting from Biology and Combined Science GCSE and KS3 biology.

A new Natural History GCSE is unlikely to be taken by many students in addition to the existing qualifications. We would therefore prefer to respond to the ambitions and need that influence this proposal by working to transform the current Biology and Combined Science GCSEs, and work with partners in Geography, Chemistry, Physics and other subjects to further promote cross-curricular and interdisciplinary aspects.

Where knowledge and skills gaps are identified to better prepare young people for later study and careers addressing environmental challenges, the Royal Society of Biology would be very happy to audit, consider and advocate for changes in the existing and future biology curriculum. Work is already underway in this area, through our curriculum framework development and curriculum committee.

We are particularly keen to place more emphasis on the environment, agriculture and food systems, ecology, fieldwork and climate change within the National Curriculum and existing qualifications and have already made significant progress in preparing for the next curriculum review.

RSB's curriculum framework:

Over the last six years the Society has taken a holistic approach to reviewing existing curricula and refining a framework for biology curriculum for ages 5 – 19. During this period RSB's Curriculum Committee and education policy team have brought together members of the bioscience and education communities to map existing biology curriculum, apply principles and best evidence in biology education, identify gaps in existing curricula and create a coherent and cohesive framework for the study of biology through compulsory education.

This framework, to be published in 2021, aims to inform bioscience curriculum development (academic, technical and vocational education) across the UK including: biological concepts; practical competencies in biology; mathematical skills in biology; ideas about the processes of scientific enquiry; development of scientific explanations; and ideas about the impacts of biological science on society and the natural world.

The Royal Society of Biology's curriculum framework frames bioscience studies in seven questions, across three dimensions:

Biology as a science - How do we study the biological world?

Core concepts of biology – What are organisms and what are they made of?

How do organisms grow and reproduce? How do organisms live together? How do organisms stay healthy and Why are organisms so different?

Biology in the world – How do people use biological knowledge?

Although not yet published, the Royal Society of Biology has already used the draft suite of documents to inform curriculum and specification design, and would be happy to use these documents to engage further with OCR ahead of our publication date.

Further details of our approach are in the School Science Review article – McLeod “Developing a framework for the biology curriculum” (2018)

https://www.ase.org.uk/system/files/SSR_September_2018_23-29_McLeod_0.pdf

In summary, the Royal Society of Biology:

- supports the goal of developing secondary school students' understanding of, and engagement with, natural history and wider environmental themes
- welcomes OCR's exploration of ways in which this could be achieved
- questions whether a new GCSE in Natural History is the best way to achieve this.

If the proposals for a Natural History GCSE are accepted and accredited by DfE and Ofqual, the Royal Society of Biology would be happy to engage further with OCR to ensure our concerns are addressed and mitigated during development of the qualification.

We have therefore responded to Q8 – 35 on themes and skills, without identifying in detail the overlap between combined science and biology GCSEs and these proposals. We will submit a supplementary letter to Jill Duffy expanding on our concerns about overlap, and in our responses to Q37 and 41 we identify concerns about the place of this qualification within the existing suite of qualifications, broader school curriculum and potential barriers to success.

8. We are referring to all life on Earth where we say flora and fauna. To what extent do you agree with the following statement?

It is important that a GCSE Natural History qualification covers:

Local flora/fauna	Strongly Disagree	Disagree	Neither Agree or Disagree	Agree	Strongly Agree
National flora/fauna	Strongly Disagree	Disagree	Neither Agree or Disagree	Agree	Strongly Agree
International flora/fauna	Strongly Disagree	Disagree	Neither Agree or Disagree	Agree	Strongly Agree

9. If you have further comments on question 8 please add them below.

An emphasis on the UK is welcomed and could be accompanied by local case studies of conservation success in the field. Inclusion of international element may dilute the study. Accessibility of sites for all schools entering students into the qualification must be considered.

However, it is not appropriate to assume that flora and fauna implies all life forms. The Royal Society of Biology urges OCR to consider including the important role fungi and microorganisms play in the functioning of our ecosystems.

In this section we'd like to understand what content you would expect to see in a Natural History GCSE to make it an interesting and purposeful qualification for students. (Please note, the Department for Education is responsible for creating the subject content should this new GCSE be approved.)

To help explore what content you would expect, we have identified below **five possible content themes**. Alongside each theme we have added some exemplification for potential content that could be covered.

Theme 1: The natural shaping of the world

Potential content areas for this theme (non-exhaustive):

- Why are landscapes as they are?
- Pangea
- Plate tectonics (vertical as well as lateral movement, e.g. giving rise to marine fossils at high altitude)
- Island formation by volcanic activity
- Ice ages/glaciation
- Distinctive landscapes (e.g. limestone pavements, glacial valleys)
- Natural changes over time and the impact on flora and fauna.

10. To what extent do you agree this theme should be included in a GCSE Natural History qualification?

Strongly Disagree	Disagree	Neither Agree or Disagree	Agree	Strongly Agree
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11. Is there any other content you would expect to see covered in this theme at GCSE level? Please add below.

Suggested additions:

“Island species”

“Natural changes over time and the impact on flora and fauna” to include

“Stromatolites increasing global oxygen, giving rise to aerobic life on earth; beavers engineering an ecosystem”

Suggested changes:

“Ice ages / glaciation” to “climatic and landscape change effects on flora and fauna”

Further comments:

To provide a coherent thread through the course, it is suggested that this first topic should focus on an understanding of Geographic and Geology. And, if the course is to focus on the British Isles, and emphasis on studying the British landscape and history.

If taught by biology specialists, this theme would tax many teachers who have not specialised in geographical aspects of biology at university.

It is possible to examine on many of the areas contained within this theme in existing qualifications, without needing to include further National Curriculum statements or assessment objectives.

12. Is there any content you do not think would be appropriate to cover for this theme at this level? Please add below.

Suggested removal:

Distinctive landscapes (e.g. limestone pavements, glacial valleys)

Further comments

We are concerned that the topics listed also cover material that is part of many A level biology courses e.g. volcanic islands.

Significant resource would be required to support most current biology teachers on this theme

Theme 2: Life in the early world

Potential content areas for this theme (non-exhaustive):

- Evidence of the early world in modern landscapes
- Dinosaurs
- The rise of mammals
- Fossil records (the Jurassic coast)
- Fossil plants and piecing ecologies together
- Evolution

13. Do you agree this theme should be included in a GCSE Natural History qualification?

Strongly Disagree	Disagree	Neither Agree or Disagree	Agree	Strongly Agree
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14. Is there any other content you would expect to see covered in this theme at GCSE level? Please add below.

Suggested changes:

“Fossil records” should include living fossil plants and animals

“Fossil plants and piecing ecologies together” to “Planting the land – the emergence of Terrestrial forests and their ecosystems – and comparisons with marine forests (kelp)”

“From fish to amphibians “

“Dinosaurs” to “From Amphibians to reptiles” – the emergence of terrestrial vertebrates”

Suggested addition:

“From fish to amphibians “

“Basic biogeography and changes since the last ice age”

“Biodiversity”

“The role of plant fungal symbiosis in the conquest of land, greening of the earth, decarbonisation of the atmosphere and development of forests”

Suggest moving from theme 3:

“Ecology”

Further comments:

If Theme 1 is the Geography of Natural History, theme 2 should be the Ecology of Natural History.

The focus on mammals and dinosaurs is too narrow, and does not represent the breadth of Natural History.

A coherent thread is required for this theme. RSB would be happy to advise further.

15. Is there any content you do not think would be appropriate to cover for this theme at this level? Please add below.

Suggest removal:

“Evolution” as a broad topic and instead should be covered through the suggested topic changes above. In this theme evolution is disconnected from the present and looks like a study of fossils and things in the past only.

Further comments:

An emphasis only on dinosaurs and the rise of mammals is at odds with a broad view of Natural History, and there does not appear to be enough focus on plants as key organisms in making much life possible.

Concerned about the broad inclusion of “Evolution” and how this will work in parallel, or overlap with, Combined Science GCSE and Biology GCSE. We know from issues in sequencing maths, physics, chemistry and biology that schools and individual teachers may not follow a topic order prescribed by exam boards, and as a result prior knowledge can only be assumed from the previous key stage, and not from a concurrent GCSE. Biology also brings evolution together with genetics, classification and links to modern technologies.

Significant resource would be required to support most current biology teachers on this theme.

It is possible to examine on many of the areas contained within this theme in existing qualifications, without needing to include further National Curriculum statements or assessment objectives.

Theme 3: Flora and fauna

Potential content areas for this theme (non-exhaustive)

- Inter-relationships; understanding of biodiversity
- Humans being part of the natural world and reliant upon it
- Habitats (world versus local, urban versus rural)
- Basic knowledge of terrestrial/aquatic organisms (animals, plants, fungi etc.)
- Taxonomies/classification
- Organisms of the British Isles
- Practical uses of flora/fauna - past and present (e.g. medicine, manufacturing)
- Ecology

16. Do you agree this theme should be included in a GCSE Natural History qualification?

Strongly Disagree	Disagree	Neither Agree or Disagree	Agree	Strongly Agree
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17. Is there any other content you would expect to see covered in this theme at GCSE level? Please add below.

Suggest adding:

Darwin's animals: the inspiration for evolution (based on Galapagos and animals in the Origin)

Aquatic life – marine: invertebrates, crustaceans, corals, fish, mammals, plants, plankton algae, ecology

Aquatic life – fresh: invertebrates, vertebrates, plants, ecology

Crustaceans and corals

Primates: diversity & behaviour

Predators & Prey: adaptations & selection

Collective behaviour: birds, locusts, humans & politics

Understanding behaviour and behavioural ecology

Ecosystem engineering and niche construction

Suggested changes:

“Habitats (world versus local, urban versus rural)” to “Habitats and ecosystems”

“Taxonomies/classification” to “Taxonomy/Classification: how and why”, to include basic plant and animal identification including classification – make sure it covers all common species including insects.

Further comments:

There is a notable absence throughout of fungi and microorganisms, which should be considered alongside plants and animals.

It is possible to examine on many of the areas contained within this theme in existing qualifications, without needing to include further National Curriculum statements or assessment objectives.

18. Is there any content you do not think would be appropriate to cover for this theme at this level? Please add below.

Suggest removing:

“Humans being part of the natural world and reliant upon it”

“Basic knowledge of terrestrial/aquatic organisms (animals, plants, fungi etc.)”

“Organisms of the British Isles” – this should be throughout theme and not individual point

Suggest moving to theme 4:

“Practical uses of flora/fauna - past and present (e.g. medicine, manufacturing)”

Suggest moving to theme 2:

Ecology

Further comments:

Significant resource would be required to support most current biology teachers on this theme.

Theme 4: Human impact on the world

Potential content areas for this theme (non-exhaustive):

- Impact of humans on ecosystems/habitats
- Climate change (e.g. impact on flora/fauna)
- Land management practices (impact on flora and fauna)
- Effects of introducing non-native species (e.g. harlequin ladybirds, Rhododendron)
- How different communities around the world (especially indigenous peoples) have developed sustainable ways to live
- Farming methods
- Impact of diet choices for land usage and environmental impact
- Conservation methods/measures
- Methods of tracking/monitoring organisms
- Controlling invasive species
- Nature reserves/marine reserves
- Introduction of grazing to encourage biodiversity (e.g. in woodland)
- Species reintroduction (e.g. wolves, beavers, red kites)
- Impacts of losing our natural history (past and present)

19. Do you agree this theme should be included in a GCSE Natural History qualification?

Strongly Disagree	Disagree	Neither Agree or Disagree	Agree	Strongly Agree
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20. Is there any other content you would expect to see covered in this theme at GCSE level? Please add below.

Suggested move from theme 3:

“Practical uses of flora/fauna - past and present (e.g. medicine, manufacturing)” and to include links to geology of British Isles and varying habitats, how the landscape has provided food and other resources – showing students that conservation has more than one use.

Suggested additions:

“How and why humans have come to dominate life on earth.”

“Zoological and botanical gardens, herbaria, fungaria, natural history museums (natural history dioramas) role in understanding change to species linked with environmental impacts”

“human-nonhuman animal relationships – e.g. people and pets, enrichment for animals in zoos, animal welfare including farm animal welfare”

“food production and agricultural systems including sustainable and unsustainable production practices”

Suggested changes:

“Impact of humans on ecosystems/habitats” to include “including farming and land management”

“Effects of introducing non-native species” to “Effects of introducing and managing non-native species”

“Conservation methods/measures” to “Biological conservation methods – the need for and practice of biological conservation including biodiversity and rewilding, and constructing and managing nature reserves from politics to practice” – the Arts have a different understanding of conservation, documents, art work, furniture etc.

“Impacts of losing our natural history (past and present)” to “Threats to our natural history (past and present)”

Further comments:

Welcome the focus on indigenous peoples’ development of sustainable ways to live. However, OCR must be cautious in this approach, as it cannot be assumed that indigenous people have or did not develop sustainable living. Anything included in this area must be upheld by scientific evidence, and consider when developments have not been sustainable and the impact on the animal (including humans) and plant populations.

In this, and other themes, avoiding a colonialist view of natural history and the natural world is vital, as is considering diversity and representation within the specification.

21. Is there any content you do not think would be appropriate to cover for this theme at this level? Please add below.

Suggested move to theme five:

“Climate change”

“Impact of diet choices for land usage and environmental impact”

Further comments:

Much of this theme is already in the biology GCSE specification although this includes many specific examples, such an approach can cause problems as they become the only examples used.

It would be possible to examine on many of the areas contained within this theme in existing qualifications, without needing to include further National Curriculum statements or assessment objectives.

Theme 5: Our changing view of the world

Potential content areas for this theme (non-exhaustive):

- Description, interpretation and classification of the natural world over time (from cave paintings to natural history documentaries)
- Land usage conflict
- How the natural world is depicted
- Changing cultural views on the natural world over time (e.g. whale hunting versus whale watching holidays)
- Natural history and culture (influence and aspiration drawn from the environment)
- Representation in art and literature (e.g. poetry).

22. Do you agree this theme should be included in a GCSE Natural History qualification?

Strongly Disagree	Disagree	Neither Agree or Disagree	Agree	Strongly Agree
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23. Is there any other content you would expect to see covered in this theme at GCSE level? Please add below.

Suggested move from theme 4:

“Climate change”

“Impact of diet choices for land usage and environmental impact”

Suggested changes:

“Land use conflict” to include “Land and marine use conflicts including changes in farming practice, impact of diet choice, pest control, funding fears for land stewardships, replanting hedgerows, decrease in pesticides, whaling and fishing quotas”

Suggested additions:

“Colonisation”

“Environmental politics”

Further comments:

This looks like a very cross-curricular theme, which is good but could be covered elsewhere in the existing curriculum.

Significant resource would be required to support most current biology teachers on this theme

24. Is there any content you do not think would be appropriate to cover for this theme at this level? Please add below.

Classification in “Description, interpretation and classification of the natural world over time (from cave paintings to natural history documentaries” – this should be covered in theme 3.

Many biology teachers would find this theme far from their existing knowledge and range of expertise and confidence.

25. In this section we have shared some ideas for possible content themes. Is there a theme that you would expect to be included in GCSE Natural History that we didn't list?

Yes

No

26. If you answered yes, please describe what this theme should be and why you think it should be included.

Theme 3 (Fauna Flora (and Fungi) could easily be expanded into multiple themes i.e. a Zoology module and a Botany/Mycology module. This would give students more time to build practical natural history and taxonomic skills and make natural history GCSE a more distinct course.

27. On a scale of 1–5, please rank the themes below in terms of importance for inclusion in a GCSE Natural History qualification.

RSB has chosen not to rank the importance of these themes in our response to this consultation.

The natural shaping of the world	1	2	3	4	5
Life in the early world	1	2	3	4	5
Flora and Fauna	1	2	3	4	5
Human impact on the world	1	2	3	4	5
Our changing view of the world	1	2	3	4	5

In this section we would like to explore what key skills you think would be important for a GCSE in Natural History.

28. To what extent do you agree that an element of outdoor study should be an important part of a GCSE in Natural History?

Strongly Disagree	Disagree	Neither Agree or Disagree	Agree	Strongly Agree
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Outdoor studies are an important part of understanding biology and the natural world. Engagement with practical activities is vital to developing knowledge and understanding, and specific skills and techniques in bioscience subjects. The Society would like to see an increase in field work in Biology GCSE and A level and Combined science, but finds that to ensure outdoor studies are included in the qualification off-site fieldwork trip must be compulsory as in geography.

However, this has financial and resource implications for the pupils and schools offering such a GCSE. Some schools may have to travel some distance to reach an appropriate site, which will impact on other subject curriculum time and may lead to reluctance to offer the new GCSE.

Any costs of field trips being passed on to parents of students taking the course may lead to further increasing the disadvantage and attainment gap, or require schools to use pupil premium funding to support such activities.

Independent schools are likely to be best placed to offer fieldwork experiences to their students, and this may further narrow the likely cohort of students taking such a course.

Local sites should be used wherever possible, rather than focussing on habitats that students and teachers may never see or experience e.g. rainforest.

The Royal Society of Biology is concerned that if an additional GCSE in Natural History includes a compulsory field work component, any opportunity to do so in Biology or Combined Science GCSE in future will be reduced. Existence of a new Natural History GCSE, with field work component, may further decrease the amount of time allocated to outdoor practical activity for biology and combined science, which is already under a lot of pressure.

Barriers to outdoor field work:

- Schools will need significant funding, and substantial training and CPD for biology teachers to make use of new equipment.
- Not all PGCE providers cover fieldwork and outdoor learning in their training.
- Student data collection that is to be used as part of a real conservation project e.g. citizen science, can engage students more deeply in fieldwork.
- In general, the reformed suite of GCSEs have moved away from coursework, which may mean field skills have to be assessed in a written examination.

Opportunities:

The Field Studies Council is well placed to support teacher CPD and fieldwork. As above, it would be preferable to engage all students in ecology fieldwork, local or further afield, through the Biology and Combined Science GCSEs, to ensure that every student in England gets the opportunity to engage in a hands on manner. The Royal Society of Biology could work with OCR and others to consider this approach in more detail.

29. How important are observation and recording skills as part of a GCSE in Natural History?

Examples include:

- **Use and understand classification systems**
- **Identify and describe diversity at different levels of scale to understand complexity and change**
- **Document and record evidence collected in the field, e.g. through use of illustration, photographic/film portfolios, field notebooks**
- **Preservation/recording/cataloguing/curation of specimens**

Very important	Important	Not sure	Not important	Not at all important
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30. How important are monitoring skills as part of a GCSE in Natural History?

Examples include:

- **Safe use of techniques for monitoring/detecting organisms. For example: Longworth traps, moth traps, camera traps, satellite tags, methods for monitoring reptiles, using photographs, bat detectors, bird ringing, etc.**
- **Use of indirect evidence (e.g. signs, tracks, landscape analysis)**
- **Use of Identification charts**

Very important	Important	Not sure	Not important	Not at all important
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31. How important are cartographic skills and use of digital methods as part of a GCSE in Natural History?

Examples include:

- **Use and understand Geographical Information Systems (GIS)**
- **Use and understand digital data collection methods**
- **Interpretation and analysis of mapped data/information**

Very important	Important	Not sure	Not important	Not at all important
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32. How important are data skills as part of a GCSE in Natural History?

Examples include:

- **Methods of tabulating and manipulating data**
- **Methods of representing data graphically**
- **Interpreting and analysing data**
- **Validity and reliability of results**
- **Understand appropriate sample sizes**
- **Use of approximation**
- **Interpretation and analysis of visual imagery (art, photographs, diagrams)**
- **Understanding of bias in written and visual representations of the natural world**
- **Critical thinking, ability to be critical about data/statistics on the natural world**

Very important	Important	Not sure	Not important	Not at all important
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33. How important are research skills as part of a GCSE in Natural History?

Examples include:

- Understand the selection and justification of a research topic
- Explore and understand the process of research
- Use of primary and secondary sources of information
- Presentation methods of research findings
- Recording sources used e.g. bibliography
- Ethical consideration of the approaches for capturing/recording impact on the environments being studied

Very important	Important	Not sure	Not important	Not at all important
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34. How important are qualitative skills as part of a GCSE in Natural History?

- Interpretation and analysis of visual imagery (art, photographs, diagrams)
- Understanding of bias in written and visual representations of the natural world

Very important	Important	Not sure	Not important	Not at all important
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35. Are there additional skills you consider important to develop as part of a GCSE in Natural History? Please tell us below.

Suggest including:

Monitoring skills – Legal aspects, and licenses required to handle certain organisms

Monitoring skills – require active participation, rather than just looking at them from a theoretical point of view

Data skills – “Understanding of bias in written and visual representations of the natural world” – to include using and interpreting correct statistics, studying data reliability and reproducibility

Research skills – “Communicating work to maximum effect” – give the impact this has on professional science

Suggest removing:

Observation and recording skills – “Preservation/recording/cataloguing/curation of specimens” Given declines in species inclusion of preservation, this could be controversial and lead to ethical and personal objections

Monitoring skills – avoid listing specific apparatus with high cost implications, or lead to issues when used in urban habitats, and techniques requiring a high level of expertise and very specific time commitments (day or year) e.g. moth traps, Longworth trap, bat detectors, monitoring reptiles and protected species. Very specific lists also limit schools and teachers autonomy to work within the experience they have and the local sites they are able to access.

Suggest changing:

Monitoring skills – “Safe use of techniques for...” to “Non-destructive use...”

Further comments:

Taxonomic skills are missing and should be included as a distinct statement

Ethical consideration of capturing and recording and the impact on environments being studied

Modern approaches to observation, data and analysis should be included

Addressing climate anxiety through strengthening qualitative skills section e.g. linking problems and solutions, mitigation and understanding within the umbrella of natural history

Case studies could be used to explore climate change and biodiversity loss

The Royal Society of Biology notes that there is significant overlap here in data skills and research skills with science and maths curricula, which may be of concern if it leads to a decrease in ability to teach and learn these skills as part of existing qualifications.

We welcome all students gaining opportunities to develop skills in observation, recording, monitoring, data, and research, however we are concerned that a new Natural History GCSE is not the best route to ensure all students in England get such experience as part of their education.

In this section we would like to find out how a GCSE in Natural History might be delivered within a UK school.

36. Do you work in a UK school or college?

Yes	No
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37. Please share anything else that you think we should consider when developing a GCSE in Natural History.

The Royal Society of Biology welcomes the aim to engage more young people in natural history, a subject that many young people have an affinity for. However, we question whether establishing a new GCSE route is the most appropriate way to build on this enthusiasm and provide a sensible progression route for students.

Before the Society can take a position on the full proposal for the Natural History GCSE, clarification is required on the proposed purpose and place of a Natural History GCSE within the existing suite of qualifications as this is unclear.

1. Where would the GCSE sit in terms of school accountability measures – progress 8 and EBacc?
2. Would schools offer this GCSE in addition to Biology and Combined Science, or in place of one of those routes?

In addition, the Society has concerns about the potential treatment of the option by schools, and would like to know of OCR has considered the following:

3. Would it be regarded by schools as a less rigorous option for lower attaining students through the sciences?
4. Or, would it be regarded as only for the most able students, seeking to take an additional GCSE on top of the triple GCSE route of individual sciences, and to develop research skills in the context of natural history?
5. Is there a risk that it will only be accessible to those in well-resourced schools with an enthusiastic teacher with specific background in ecology or natural history?

Concerns of the Royal Society of Biology and many of our teacher, curriculum and assessment expert and education researcher members:

A new GCSE qualification is unlikely to impact the teaching of 5 – 11 year olds, but we are concerned ecology content might be removed from KS3, and that there is some overlap with existing GCSEs and KS5 biology, which may lead to removal of concepts, skills and practical experiences from existing subjects to be incorporated instead into the new GCSE.

Much of what is proposed is already covered within biology GCSE specifications. The Society is concerned that a parallel GCSE may detrimentally impact biology education at 14-16 e.g. if concepts, practical skills and techniques, are removed from biology to avoid duplication. We note that it is challenging to sequence parallel GCSEs that pick up concepts from one another and that this may also impact content in Biology and Combined Science GCSE. Prior knowledge can only be assumed from the previous key stage, and as a result more overlap in concepts and skills may be experienced by students taking both Natural History GCSE and Biology or Combined Science GCSE.

If this new GCSE is used as a replacement for either Biology or Combined Science, our young people would lack significant skills, knowledge and understanding, from the

broader biology curriculum and required for life as a citizen or to progress into biology A level. Including, but not limited to: health and wellbeing including mental health, genetic conditions, infection disease, vaccines and lifestyle and reproduction, contraception, fertility in biology, and if the new GCSE is a replacement for Combined Science, Chemistry and Physics would be missing from students' broad science education.

Within the themes proposed:

- Much of the theme content overlaps with existing qualifications, and could be assessed within these qualifications with limited need to add national curriculum or specification statements, or assessment objectives.
- Recognising that the GCSE is yet to be developed, the current theme areas do not seem to have a coherent thread or acknowledge learning progression from key stage 3 or into key stage 5.
- Care should be taken to avoid a colonial view of natural history. We welcome the emphasis on indigenous communities in one theme, but with caution that it is supported by a science evidence base, and recommend that from first planning a “decolonise the curriculum” viewpoint is taken. We also support a “no more heroes” approach to specific individuals within a curriculum – seeking to exemplify applications and impact through local, diverse and relatable role models.
- Significant concerns about the level at which some of the areas in proposed themes could be examined e.g. Dinosaurs, and that much of the assessment may have to rely on recall.
- Fungi and microorganisms are lacking from the current proposals, and must be considered alongside plants and animals

We welcome an emphasis on animal behaviour, but caution that this should not solely focus on mammals.

Next steps:

The Royal Society of Biology would be happy to work with OCR, using the principles and detail of our biology curriculum framework for 5 – 19, and the science education and bioscience expertise of our members and member organisations, to address these concerns.

We would appreciate answers from OCR on how the following fits with their proposals:

6. Which teachers does OCR anticipate will teach this course?
7. Does OCR aim for this to be largely a humanities or science qualification, or an equal split?
8. How does OCR anticipate this fitting with the current suite of qualifications in Progress 8 and EBacc?
9. Is this qualification intended to sit alongside Biology GCSE, or Combined Science GCSE, or as a replacement for one of these?

10. Recognising that students rarely get a totally free choice of subjects, does OCR anticipate schools will enter lower attaining students in place of a science GCSE, or higher attainment students taking the GCSE as an addition to the three existing science GCSE qualifications on the triple route?

38. Are you happy to receive updates from us on our progress?

Yes	No
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39. Would you be happy in principle to provide additional advice and input in the future?

Yes	No
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40. Would your organisation be interested in becoming involved in developing the qualification content or support materials for OCR?

Yes	No	Not applicable
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41. Please write here any final comments you'd like to make on this topic.

Question 36 asks "Do you work in a school or college" with a Yes or No response.

While the Royal Society of Biology is not involved in direct teaching and learning, we do represent teachers, students and the bioscience community, and one of our priorities is to support biology education through primary, secondary, further and higher education. As such, we are able to collate and share views on some of the questions filtered out due to our answer "No" to Q36. To gain further insight into the views of our members, when calling for comments we asked:

- To what extent do you feel there is a need, demand and scope for a GCSE in natural history?
- What impact might a natural history GCSE may have upon science taught at 5 – 11, 11-14, 14- 16 and 16-19?
- What impact do you foresee a natural history GCSE may have upon the teaching of Biology and Combined Science at GCSE?
- How might we raise the profile of natural history and ecology within biology rather than through a separate GCSE?
- What progression routes might students who have taken a GCSE in natural history move on to study?

In addition to the comments below, covering questions (Q37 - 45 if answer to Q36 had been “yes”) that seek views of those who may teach the subject, the Royal Society of Biology intends to submit a supplementary letter providing the Society’s view on the proposals for a new Natural History GCSE, the mixed views of our community, and the impact the new GCSE may have on Biology and Combined Science GCSEs now and in the future.

Curriculum space and breadth:

As optional GCSE choices are already very competitive; many schools will not have the capacity to offer another science. Therefore, only a small number of students may be able to take a GCSE in natural history and it becoming a niche subject.

Schools may struggle to deliver this alongside conventional subjects. The route through the sciences at GCSE is already complex, with two routes covering a double GCSE or triple GCSE (often timetabled in less than the equivalent of two or three times a single GCSE) and tiers of entry. The sciences are the only subject with two routes at GCSE, and introduction of a new qualification may further confuse.

Research commissioned in 2018/19 by the Association for Science Education, Institute of Physics, Royal Society, Royal Society of Biology and Royal Society of Chemistry found that:

only three of 513 schools gave the sciences a fully proportionate amount of time on the timetable and deploy appropriate teaching expertise to each science subject.

Only 13% of responding schools allowed students a completely free choice of either Combined Science or the separate triple science route.

Schools often require students to select GCSEs from option blocks e.g. compulsory subject + a language + a humanity etc. It is unclear where a Natural History GCSE would sit, and the opportunity cost to students in creating another science-based route.

Students taking both Natural History GCSE and Biology or Geography GCSE would experience a significant amount of overlap and repetition in ecology, research, data collection in both GCSE and A level.

Adapting GCSE Biology could be achieved by using ‘Natural History’ to provide a context to thread through other biological content, particularly human biology.

Funding and support available:

Bureaucracy around organising field-trips and time-tabling difficulties could be a barrier to fieldwork as well as financial cost.

Existing organisations may be able to support teacher CPD and fieldwork in this area e.g. Field Studies Council, Linnean Society, British Ecological Society,

Association for Study of Animal Behaviour and British Mycological Society. We would be happy to facilitate discussions between OCR and these RSB member organisations.

Some schools invested significant time and financial resource into Environmental and Land-based Studies, and are reluctant to do so again.

If the Natural History GCSE isn't included in EBacc, schools may be reluctant to deviate from the core qualifications and national uptake will be low.

If the Natural History GCSE is included in EBacc as an alternative science route, resources may be pulled from Biology teaching and learning.

Engagement with/understanding of nature, experiential learning, build observation and enquiry skills:

While we agree that more ecological content should be included in education, but separating it out from biology and geography is not necessarily the best route to achieving that aim.

Teaching resource needed:

It is not clear which teachers would lead this course. If it is existing biology teachers, or incoming biology PGCE students, significant CPD support and changes to ITT provision will be required.

Concern around teacher specialism – biology teachers may not feel confident in teaching the Geography elements and vice versa.

The sciences already face challenges in recruitment and retention of specialist teachers, and the expectation for teachers of the sciences to teach outside their subject specialism. A new Natural History GCSE may further exacerbate this situation.

Research commissioned in 2018/19 by the Association for Science Education, Institute of Physics, Royal Society, Royal Society of Biology and Royal Society of Chemistry found that:

At 48% of responding schools, teachers reported that they are required to teach outside of their main field of teaching at Key Stage 4.

Student interest in a GCSE in natural history:

At this point the Royal Society of Biology does not have evidence to support or disprove the popularity of this potential GCSE with students. We would be interested to see any evidence or research OCR has conducted in this area. The Society recognises and celebrates student interest in climate change, the natural world, and human impact on the environment.

We welcome a drive to motivate students to want to become scientists and managers who can address pressing environmental challenges.

The Society questions whether establishing a new GCSE in natural history is the best route to harnessing this interest, whereas we consider adapting existing qualifications and National Curriculum instead – in order to engage all students – to be an impactful alternative.

The Society would expect the number of entries to be similar to previous qualifications such as additional applied GCSE or environmental and land based studies i.e. around 2000 – 3000 per year across all exam boards. We question whether such a small number of entries warrants the existence of a new GCSE that may detract from the core science qualifications taken by all students.

Progression route from the proposed GCSE:

This course will not prepare students for A-Level biology on its own. Students taking GCSE natural history would be at a significant disadvantage regarding A Level Biology. Students opting to specialise too early will reduce/impact engagement with A Level Biology.

Students who wish to progress onto technical routes might benefit from this GCSE.

Ability to progress onto further study/careers will depend upon how universities view a GCSE in natural history in terms of admissions.

Astronomy GCSE may be a good parallel for OCR to consider i.e. how many FE and HE courses take students with a good Astronomy GCSE but lower attainment physics GCSE grades, or Combined Science GCSE?

Need for a level 3 (A level) qualification in this area:

While a progression route from a Natural History GCSE to Natural History A level and into further or higher education may be viable, it is likely most Universities would continue to look to Biology GCSE and A level as a well-rounded progression route into ecology or environmental sciences.

The Royal Society of Biology would encourage OCR to engage with HEIs to investigate this, and the Royal Society of Biology would be happy to discuss with our Heads of University Biosciences.

Barriers to potential success of this qualification:

- Some schools will be better placed to offer this course than others
- Cost
- Teacher expertise
- Location / Access to approved fieldwork locations
- Equipment (IT, monitoring, data collection)
- Timetabling / Space in school option blocks

- Ability for a school to offer an additional after school or weekend GCSE
- Most qualifications seen as “side subjects” that overlapped with core subjects, were not eligible for reform in 2014, there is a risk that this qualification would follow the same path after initial enthusiasm wore off.

Next steps:

The Royal Society of Biology could commit to:

- Sharing with OCR our mapping of the proposed Natural History GCSE themes to our draft biology curriculum framework 5 – 19. We will submit a supplementary letter to OCR on this matter.
- Reviewing proposed 5-19 framework to ensure adequate ecological content is included in existing qualifications as part of the next curriculum review.
- Integrating the skills and values of natural history into the existing curriculum, and ensuring all students engage with environmental concerns and solutions
- Working with OCR to identify gaps in the current specifications and national curriculum, and with our member organisations including Association for Study of Animal Behaviour, British Ecological Society, British Mycological Society, British Society of Animal Science and Field Studies Council, to further emphasise the importance of ecology and field work in compulsory science education, incorporating a holistic whole-organism approach, climate change science
- Consider and further advocate for reintroduction of field work trips, with teacher assessed and moderated coursework. Noting, however, that unless this is compulsory funding residential field trips is very difficult for many schools without parental contribution.

The Royal Society of Biology feels OCR should consider:

- The place of this GCSE within the existing suite of GCSEs, and the impact of a new science-related GCSE on those qualifications
- What the lifetime of this qualification is
- The anticipated size of classes and number of entries for such a qualification
- The expense schools will incur in setting up and maintaining such a course in addition to the existing suite of qualifications
- Whether other routes may be preferable e.g. strengthening these areas in existing curriculum at key stage 4, development of a “Natural History and Conservation” T level or general qualification at post-16, whether resources can be better channelled into producing resources to cover natural history themes in key stages 1,2 and 3 instead.