



Science Policy

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Approved by Chair _____

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Vision Statement

Through our Science curriculum, we aim to ensure that all children develop a life-long passion for investigation. All children should be able to communicate their thoughts and ideas confidently and listen to others with respect. They should have the fundamental skills necessary to enable them to be successful people in an ever changing society.

Rationale: The Importance of Science

Science stimulates and excites pupils' curiosity about phenomena and events in the world around them. It also satisfies this curiosity with knowledge because Science links direct practical experience with ideas, it can engage learners at many levels. Scientific method is about developing and evaluating explanations through experimental evidence and modelling. This is a spur to critical and creative thought. Through Science, pupils understand how major scientific ideas contribute to technological change-impacting on industry, business and medicine and improving quality of life. Pupils recognise the cultural significance of Science and trace its worldwide development. They learn to question and discuss science-based issues that may affect their own lives, the direction of society and the future of the world. (National Curriculum).

A high-quality science education provides the foundations for understanding the world through the specific disciplines of biology, chemistry and physics. Science has changed our lives and is vital to the world's future prosperity, and all pupils should be taught essential aspects of the knowledge, methods, processes and uses of science. Through building up a body of key foundational knowledge and concepts, pupils should be encouraged to recognise the power of rational explanation and develop a sense of excitement and curiosity about natural phenomena. They should be encouraged to understand how science can be used to explain what is occurring, predict how things will behave, and analyse causes.

Aims and Intentions

The national curriculum for science aims to ensure that all pupils:

- Develop **scientific knowledge and conceptual understanding** through the specific disciplines of biology, chemistry and physics
- Develop understanding of the **nature, processes and methods of science** through different types of science enquiries that help them to answer scientific questions about the world around them
- Are equipped with the scientific knowledge required to understand the uses and implications of science, today and for the future.

The Teaching of Science

It is the priority of the school to plan, resource and deliver a rich, varied and engaging science curriculum, which will be supported by the cornerstones Curriculum. This curriculum directly relates to the programs of study as set by the National Curriculum Programs of study 2013 KS1 and KS2, but brings a holistic approach to the areas of study with topic based themes.

Planning will be continually reviewed and developed to take into account new and exciting opportunities and pupil needs.

Each Key stage is timetabled for 2hours of Science per week.

Planning is efficient and effective when:

- It enables teachers to provide a coherent, relevant and engaging curriculum that promotes continuity in pupils' learning
- It shows clear objectives and how these will be achieved
- Existing plans are adapted using high-quality published resources as starting points and supports the schools' ongoing review of the curriculum
- It uses ICT to support learning There are three levels of planning:
 - Long-term plans
 - Medium-term plans
 - Short-term plans

Teaching Science at Key Stage 1

The principal focus of science teaching in key stage 1 is to enable pupils to experience and observe phenomena, looking more closely at the natural and humanly-constructed world around them. They should be encouraged to be curious and ask questions about what they notice. They should be helped to develop their understanding of scientific ideas by using different types of scientific enquiry to answer their own questions, including observing changes over a period of time, noticing patterns, grouping and classifying things, carrying out simple comparative tests, and finding things out using secondary sources of information. They should begin to use simple scientific language to talk about what they have found out and communicate their ideas to a range of audiences in a variety of ways. Most of the learning about science should be done through the use of first-hand practical experiences, but there should also be some use of appropriate secondary sources, such as books, photographs and videos.

‘Working scientifically’ is described separately in the programme of study, but must **always** be taught through and clearly related to the teaching of substantive science content in the programme of study. Throughout the notes and guidance, examples show how scientific methods and skills might be linked to specific elements of the content.

Pupils should read and spell scientific vocabulary at a level consistent with their increasing word reading and spelling knowledge at key stage 1.

Teaching Science at Lower Key Stage 2 – Year 3/4

The principal focus of science teaching in lower key stage 2 is to enable pupils to broaden their scientific view of the world around them. They should do this through exploring, talking about, testing and developing ideas about everyday phenomena and the relationships between living things and familiar environments, and by beginning to develop their ideas about functions, relationships and interactions. They should ask their own questions about what they observe and make some decisions about which types of scientific enquiry are likely to be the best ways of answering them, including observing changes over

time, noticing patterns, grouping and classifying things, carrying out simple comparative and fair tests and finding things out using secondary sources of information. They should draw simple conclusions and use some scientific language, first, to talk about and, later, to write about what they have found out.

‘Working scientifically’ is described separately at the beginning of the programme of study, but must **always** be taught through and clearly related to substantive science content in the programme of study. Throughout the notes and guidance, examples show how scientific methods and skills might be linked to specific elements of the content.

Pupils should read and spell scientific vocabulary correctly and with confidence, using their growing word reading and spelling knowledge.

Teaching Science at Upper Key Stage 2 – Year 5/6

The principal focus of science teaching in upper key stage 2 is to enable pupils to develop a deeper understanding of a wide range of scientific ideas. They should do this through exploring and talking about their ideas; asking their own questions about scientific phenomena; and analysing functions, relationships and interactions more systematically. At upper key stage 2, they should encounter more abstract ideas and begin to recognise how these ideas help them to understand and predict how the world operates. They should also begin to recognise that scientific ideas change and develop over time. They should select the most appropriate ways to answer science questions using different types of scientific enquiry, including observing changes over different periods of time, noticing patterns, grouping and classifying things, carrying out comparative and fair tests and finding things out using a wide range of secondary sources of information. Pupils should draw conclusions based on their data and observations, use evidence to justify their ideas, and use their scientific knowledge and understanding to explain their findings.

‘Working and thinking scientifically’ is described separately at the beginning of the programme of study, but must **always** be taught through and clearly related to substantive

science content in the programme of study. Throughout the notes and guidance, examples show how scientific methods and skills might be linked to specific elements of the content.

Pupils should read, spell and pronounce scientific vocabulary correctly.

Provision and Differentiation

- By recognising that some children may need specific help with their Science skills e.g. if they are dyslexic, although they may have other strengths within the subject.
- By giving extra support to children who need extra opportunities for reinforcement.
- By ensuring that pupils with particular ability and flair for Science are extended through the use of additional, more demanding, open ended tasks and planned challenges within each lesson.
- Pupil Premium children work in small groups, as identified, and participate in appropriate groups each week to aid their progress and attainment in Science.

Science Assessment

Each term, Science will be assessed against the Rising Stars units of work. Each topic gives clear guidelines for assessing pupil progress and these will inform teacher assessment.

Teach assessments will be made at the end of each term following the guidelines for identifying children working at the Age Related Expectations (Emerging, Developing, Secure and Greater Depth).

Year 6 children will be assessed against the end of Key Stage judgments of Working Towards the expected Standard (WTS), or At the Expected Standard.

At the end of the year, Science will be assessed against the National Curriculum Level descriptors, end of topic assessment will be used support judgments.

Assessment within Lesson.

Each piece of work will be marked and assessed using the School's Marking Policy.

Each lesson's work will have the Success Criteria in the form of a Learning Ladder that outlines the topic area being taught and 2 statements that outline the differentiated learning that will take place. The third box will be a direct link to how each child has proved to be working scientifically that lesson. The Learning Ladder will be ticked in accordance with how successful the children were as assessed by the teaching staff at the end of the lesson.

Children will also be given the opportunity to regularly assess themselves against these same Success criteria and periodically have the opportunity to Peer assess.

For example

KS2 Overarching Learning: SCIENCE – Electricity L3		G			I					
Success will include these:		Self assessment			Peer assessment			Adult assessment		
*	I can say how a circuit works.									
**	I can explain the key terms of how a circuit works.									
W.S.	I can present findings from enquiries, including conclusions and explanations, in oral and written forms such as displays and other presentations									

Role of the Head Teacher

In consultation with the Science Subject leader, the Head teacher:

- Determines the ways Science should support, enrich and extend the curriculum;
- Decides the provision and allocation of resources;
- Decides ways in which developments can be assessed, and records maintained;
- Ensures that Science is used in a way to achieve the aims and objectives of the school;
- Ensures that there is a Science policy, and identifies a Science subject leader.

Role of the Subject Leader

The Science subject leader should:

- Ensure the development of a schemes of work for the Science curriculum. This will follow the New Primary Framework guidelines and will be built around the school's curriculum topics and cover aspects of the Science National Curriculum statements.
- Promote the integration of scientific thinking and problem solving within appropriate teaching and learning activities;
- Manage the provision and deployment of resources and give guidance on classroom organisation support.
- Inspire colleagues to deliver high quality teaching and learning opportunities.
- Analyse data to identify strengths and weaknesses in outcomes; planning for improvement accordingly.
- Write, monitor and evaluate an action plan for Science for the School Improvement Plan
- Lead INSET within the school, and investigate suitable courses elsewhere.
- Act as a contact point between the school and support agencies, including schools within Shine Academies.
- Provide technical expertise.
- Lead the evaluation and review of the school's Science policy.

- Bid for and manage the budget for this curriculum area.
- Monitor and review the Science provision within the school.

Monitoring and Evaluation

The teaching of Science will be monitored through the School Improvement Plan by the Science subject leader in the first instance and then by the Senior Leadership Team and the Head teacher. SATS results are analysed and areas for development prioritised. Governors are kept informed via the head teacher's termly report.

Timetabling

Science is allocated as a discrete subject on the timetable, given 1 hour per week.

Planning

All sessions should be planned using the schools planning proforma.

Objectives for the lessons being taught should be taken straight from the Science Long and Medium term planning, which follow the National Curriculum for Science and plans for introduction, implementation and embedding of skills.

All lessons should be fully differentiated and accessible to all pupils.

Marking

Teachers mark pupil's work throughout the lesson to ensure that errors and misconceptions are addressed as soon as possible, rather than a pupil complete a whole piece of work incorrectly where possible. Handwriting formation, size and spellings are also corrected as

issues arise, with pupil's given the opportunity to practice during the lesson in line with the English policy

Key scientific terms will be highlighted and gap tasks will move th learning on by asking the children to consider how an investigation may have been conducted differently.

Please refer to our Marking Policy for further guidance on marking.

Inclusion

In planning work the teachers will aim:

- to provide breadth and balance of language activities for all pupils
- to provide a differentiated Science curriculum to meet the needs of all the pupils through the continuity of experiences
- to set suitable learning challenges for individuals or small groups of pupils
- to respond to pupils diverse learning needs
- to liaise with the Special Needs Co-ordinator to ensure that provision is made for all pupils
- to ensure interventions are applicable with clear objectives set

Targets should be identified on short term planning to overcome potential barriers to learning and assessment for individuals and groups of pupils.

SEND Provision

Pupils identified as needing extra support in Science will be given the appropriate help in the classroom. Providing for pupils with special educational needs should take account of each pupil's particular learning and assessment requirements and incorporate specific approaches which will allow individuals to succeed, such as using enquiries at an appropriate level of difficulty and planning for additional support.

All appendices are subject to change based on annual review by Subject Leaders.

This policy will be reviewed annually unless there are any changes within the Trust.

Appendix 1: Statutory Requirements of Teaching

Science.

The assessment of children at the end of year academic year will be in line with the statutory requirements to Work Scientifically. These are the fundamental principles that underpin all topic areas and build progressively from Key Stage1 and develop the rounded knowledge needed to enable children at the end of Key Stage 2 to transition into Key Stage 3.

Statutory requirements
During years 1 and 2, pupils should be taught to use the following practical scientific methods, processes and skills through the teaching of the programme of study content: <ul style="list-style-type: none">• asking simple questions and recognising that they can be answered in different ways• observing closely, using simple equipment• performing simple tests• identifying and classifying• using their observations and ideas to suggest answers to questions• gathering and recording data to help in answering questions.
Statutory requirements
During years 3 and 4, pupils should be taught to use the following practical scientific methods, processes and skills through the teaching of the programme of study content: <ul style="list-style-type: none">• asking relevant questions and using different types of scientific enquiries to answer them• setting up simple practical enquiries, comparative and fair tests• making systematic and careful observations and, where appropriate, taking accurate measurements using standard units, using a range of equipment, including thermometers and data loggers• gathering, recording, classifying and presenting data in a variety of ways to help in answering questions• recording findings using simple scientific language, drawings, labelled diagrams, keys, bar charts, and tables• reporting on findings from enquiries, including oral and written explanations, displays or presentations of results and conclusions

- using results to draw simple conclusions, make predictions for new values, suggest improvements and raise further questions
- identifying differences, similarities or changes related to simple scientific ideas and processes
- using straightforward scientific evidence to answer questions or to support their findings.

Statutory requirements

During years 5 and 6, pupils should be taught to use the following practical scientific methods, processes and skills through the teaching of the programme of study content:

- planning different types of scientific enquiries to answer questions, including recognising and controlling variables where necessary
- taking measurements, using a range of scientific equipment, with increasing accuracy and precision, taking repeat readings when appropriate
- recording data and results of increasing complexity using scientific diagrams and labels, classification keys, tables, scatter graphs, bar and line graphs
- using test results to make predictions to set up further comparative and fair tests
- reporting and presenting findings from enquiries, including conclusions, causal relationships and explanations of and degree of trust in results, in oral and written forms such as displays and other presentations
- identifying scientific evidence that has been used to support or refute ideas or arguments.

Appendix 2: Programmes of Study

The following programmes of study outline the Subject Skills that are statutory requirements as outlined by the national curriculum.

Each Year group will be taught a range of topics that are built upon on a two year cycle.

Year 1	
Plants	<p>Pupils should be taught to:</p> <ul style="list-style-type: none"> • Identify and name a variety of common wild and garden plants, including deciduous and evergreen trees • Identify and describe the basic structure of a variety of common flowering plants, including trees.
Animals Including Humans	<p>Pupils should be taught to:</p> <ul style="list-style-type: none"> ▪ identify and name a variety of common animals including fish, amphibians, reptiles, birds and mammals ▪ identify and name a variety of common animals that are carnivores, herbivores and omnivores ▪ describe and compare the structure of a variety of common animals (fish, amphibians, reptiles, birds and mammals, including pets) ▪ identify, name, draw and label the basic parts of the human body and say which part of the body is associated with each sense.
Everyday Materials	<p>Pupils should be taught to:</p> <ul style="list-style-type: none"> ▪ distinguish between an object and the material from which it is made ▪ identify and name a variety of everyday materials, including wood, plastic, glass, metal, water, and rock ▪ describe the simple physical properties of a variety of everyday materials ▪ compare and group together a variety of everyday materials on the basis of their simple physical properties.
	<p>Pupils should be taught to:</p> <ul style="list-style-type: none"> ▪ observe changes across the four seasons ▪ observe and describe weather associated with the seasons and how day length varies.

Year 2	
Living things and their habitats	<p>Pupils should be taught to:</p> <ul style="list-style-type: none"> ▪ explore and compare the differences between things that are living, dead, and things that have never been alive ▪ identify that most living things live in habitats to which they are suited and describe how different habitats provide for the basic needs of different kinds of animals and plants, and how they depend on each other ▪ identify and name a variety of plants and animals in their habitats, including micro- habitats ▪ describe how animals obtain their food from plants and other animals, using the idea of a simple food chain, and identify and name different sources of food.
Plants	<p>Pupils should be taught to:</p> <ul style="list-style-type: none"> ▪ observe and describe how seeds and bulbs grow into mature plants ▪ find out and describe how plants need water, light and a suitable temperature to grow and stay healthy.
Animals Including Humans	<p>Pupils should be taught to:</p> <ul style="list-style-type: none"> ▪ notice that animals, including humans, have offspring which grow into adults ▪ find out about and describe the basic needs of animals, including humans, for survival (water, food and air) ▪ describe the importance for humans of exercise, eating the right amounts of different types of food, and hygiene.
Uses of everyday materials	<p>Pupils should be taught to:</p> <ul style="list-style-type: none"> ▪ identify and compare the suitability of a variety of everyday materials, including wood, metal, plastic, glass, brick, rock, paper and cardboard for particular uses ▪ find out how the shapes of solid objects made from some materials can be changed by squashing, bending, twisting and stretching.

Year 3	
Plants	<p>Pupils should be taught to:</p> <ul style="list-style-type: none"> ▪ identify and describe the functions of different parts of flowering plants: roots, stem/trunk, leaves and flowers ▪ explore the requirements of plants for life and growth (air, light, water, nutrients from soil, and room to grow) and how they vary from plant to plant ▪ investigate the way in which water is transported within plants ▪ explore the part that flowers play in the life cycle of flowering plants, including pollination, seed formation and seed dispersal.
Animals including Humans	<p>Pupils should be taught to:</p> <ul style="list-style-type: none"> ▪ identify that animals, including humans, need the right types and amount of nutrition, and that they cannot make their own food; they get nutrition from what they eat ▪ identify that humans and some other animals have skeletons and muscles for support, protection and movement.
Rocks	<p>Pupils should be taught to:</p> <ul style="list-style-type: none"> ▪ compare and group together different kinds of rocks on the basis of their appearance and simple physical properties ▪ describe in simple terms how fossils are formed when things that have lived are trapped within rock ▪ recognise that soils are made from rocks and organic matter.
Light	<p>Pupils should be taught to:</p> <ul style="list-style-type: none"> ▪ recognise that they need light in order to see things and that dark is the absence of light ▪ notice that light is reflected from surfaces ▪ recognise that light from the sun can be dangerous and that there are ways to protect their eyes ▪ recognise that shadows are formed when the light from a light source is blocked by an opaque object ▪ find patterns in the way that the size of shadows change.
Forces and Magnets	<p>Pupils should be taught to:</p> <ul style="list-style-type: none"> ▪ compare how things move on different surfaces ▪ notice that some forces need contact between two objects, but magnetic forces can act at a distance ▪ observe how magnets attract or repel each other and attract some materials and not others ▪ compare and group together a variety of everyday materials on the basis of whether they are attracted to a magnet, and identify some magnetic materials ▪ describe magnets as having two poles ▪ predict whether two magnets will attract or repel each other, depending on which poles are facing.

Year 4	
Living things and their habitats	<p>Pupils should be taught to:</p> <ul style="list-style-type: none"> ▪ recognise that living things can be grouped in a variety of ways ▪ explore and use classification keys to help group, identify and name a variety of living things in their local and wider environment ▪ recognise that environments can change and that this can sometimes pose dangers to living things.
Animals including Humans	<p>Pupils should be taught to:</p> <ul style="list-style-type: none"> ▪ describe the simple functions of the basic parts of the digestive system in humans ▪ identify the different types of teeth in humans and their simple functions ▪ construct and interpret a variety of food chains, identifying producers, predators and prey.
States of Matter	<p>Pupils should be taught to:</p> <ul style="list-style-type: none"> ▪ compare and group materials together, according to whether they are solids, liquids or gases ▪ observe that some materials change state when they are heated or cooled, and measure or research the temperature at which this happens in degrees Celsius (°C) ▪ identify the part played by evaporation and condensation in the water cycle and associate the rate of evaporation with temperature.
Sound	<p>Pupils should be taught to:</p> <ul style="list-style-type: none"> ▪ identify how sounds are made, associating some of them with something vibrating ▪ recognise that vibrations from sounds travel through a medium to the ear ▪ find patterns between the pitch of a sound and features of the object that produced it ▪ find patterns between the volume of a sound and the strength of the vibrations that produced it ▪ recognise that sounds get fainter as the distance from the sound source increases.
Electricity	<p>Pupils should be taught to:</p> <ul style="list-style-type: none"> ▪ identify common appliances that run on electricity ▪ construct a simple series electrical circuit, identifying and naming its basic parts, including cells, wires, bulbs, switches and buzzers ▪ identify whether or not a lamp will light in a simple series circuit, based on whether or not the lamp is part of a complete loop with a battery ▪ recognise that a switch opens and closes a circuit and associate this with whether or not a lamp lights in a simple series circuit ▪ recognise some common conductors and insulators, and associate metals with being good conductors.

Year 5	
Living Things and their habitats	<p>Pupils should be taught to:</p> <ul style="list-style-type: none"> ▪ describe the differences in the life cycles of a mammal, an amphibian, an insect and a bird ▪ describe the life process of reproduction in some plants and animals.
Animals including Humans	<p>Pupils should be taught to:</p> <ul style="list-style-type: none"> ▪ describe the changes as humans develop to old age.
Properties and Changes in Materials	<p>Pupils should be taught to:</p> <ul style="list-style-type: none"> ▪ compare and group together everyday materials on the basis of their properties, including their hardness, solubility, transparency, conductivity (electrical and thermal), and response to magnets ▪ know that some materials will dissolve in liquid to form a solution, and describe how to recover a substance from a solution ▪ use knowledge of solids, liquids and gases to decide how mixtures might be separated, including through filtering, sieving and evaporating ▪ give reasons, based on evidence from comparative and fair tests, for the particular uses of everyday materials, including metals, wood and plastic ▪ demonstrate that dissolving, mixing and changes of state are reversible changes ▪ explain that some changes result in the formation of new materials, and that this kind of change is not usually reversible, including changes associated with burning and the action of acid on bicarbonate of soda.
Earth and Sapce	<p>Pupils should be taught to:</p> <ul style="list-style-type: none"> ▪ describe the movement of the Earth, and other planets, relative to the Sun in the solar system ▪ describe the movement of the Moon relative to the Earth ▪ describe the Sun, Earth and Moon as approximately spherical bodies ▪ use the idea of the Earth's rotation to explain day and night and the apparent movement of the sun across the sky.
Forces	<p>Pupils should be taught to:</p> <ul style="list-style-type: none"> ▪ explain that unsupported objects fall towards the Earth because of the force of gravity acting between the Earth and the falling object ▪ identify the effects of air resistance, water resistance and friction, that act between moving surfaces ▪ recognise that some mechanisms, including levers, pulleys and gears, allow a smaller force to have a greater effect

Year 6	
Living things and their habitats	<p>Pupils should be taught to:</p> <ul style="list-style-type: none"> ▪ describe how living things are classified into broad groups according to common observable characteristics and based on similarities and differences, including micro-organisms, plants and animals ▪ give reasons for classifying plants and animals based on specific characteristics.
Animals including Humans	<p>Pupils should be taught to:</p> <ul style="list-style-type: none"> ▪ identify and name the main parts of the human circulatory system, and describe the functions of the heart, blood vessels and blood ▪ recognise the impact of diet, exercise, drugs and lifestyle on the way their bodies function ▪ describe the ways in which nutrients and water are transported within animals, including humans.
Evolution and Inheritance	<p>Pupils should be taught to:</p> <ul style="list-style-type: none"> ▪ recognise that living things have changed over time and that fossils provide information about living things that inhabited the Earth millions of years ago ▪ recognise that living things produce offspring of the same kind, but normally offspring vary and are not identical to their parents ▪ identify how animals and plants are adapted to suit their environment in different ways and that adaptation may lead to evolution.
Light	<p>Pupils should be taught to:</p> <ul style="list-style-type: none"> ▪ recognise that light appears to travel in straight lines ▪ use the idea that light travels in straight lines to explain that objects are seen because they give out or reflect light into the eye ▪ explain that we see things because light travels from light sources to our eyes or from light sources to objects and then to our eyes ▪ use the idea that light travels in straight lines to explain why shadows have the same shape as the objects that cast them.
Electricity	<p>Pupils should be taught to:</p> <ul style="list-style-type: none"> ▪ associate the brightness of a lamp or the volume of a buzzer with the number and voltage of cells used in the circuit ▪ compare and give reasons for variations in how components function, including the brightness of bulbs, the loudness of buzzers and the on/off position of switches ▪ use recognised symbols when representing a simple circuit in a diagram.

Appendix 3: Science Enquiry/Investigations.

When carrying out an investigation, to use the working scientifically principles correctly, the children's work will follow a format that follows all the way through the school.

Years 1 and 2

- Investigation Question – why we are doing this (give this to the children)
- What I think.
- Results.
- What I found.

Years 3 and 4

- Investigation question (why we are doing this)
- Prediction
- Method
- Diagram
- Results
- Conclusion

Years 5 and 6

- Investigation Question (why we are doing this)
- Hypothesis
- Variables
- Method
- Diagram
- Results
- Conclusion
- Evaluation

Appendix 4: Sample Science gap tasks.

1. What did you find out from this experiment?

I found out that...

2. What was the most important feature of this experiment? Why do you think this?

The most important feature was... I think this because...

3. If you changed one thing to use in the experiment, what would it be? Why?

I would change the ... because...

4. If you were to do the experiment again, what would you do differently?

I would do...

5. Summarise what you learned in the last lesson in 30 words.

X is important because it slows down the absorption of the liquid

6. From what you learned, write a true or false question for your friend to answer.

Is the heart a double pump, true or false?

7. Pick a scientific word from what you learned in the last lesson and explain what it means.

OR,

Look at the scientific word I've highlighted. What does it mean?

Habitat means a place for a living organism to live.