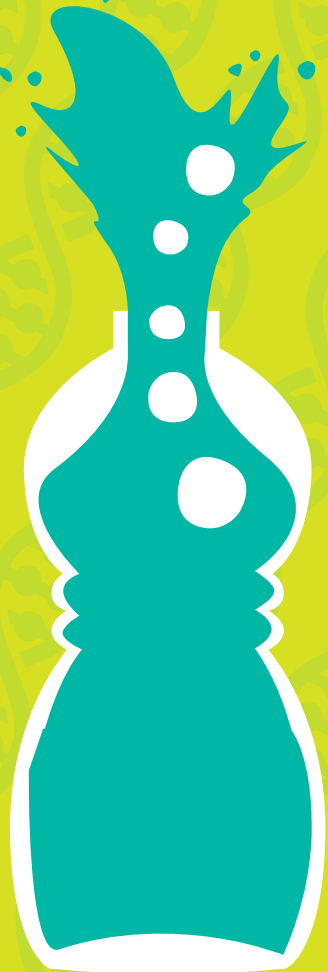




does science

100 sizzling
science-based ideas
for Messy Churches

Edited by **David Gregory**



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Introduction

Messy Church does science?

Maybe that was the question you asked yourself when you first came across this book. I mean, what does science have to do with church anyhow? Faith and science just don't mix. And if they do, well, it's a bit explosive! That's the impression you might have got from listening to a lot of voices in the media and perhaps church too. But maybe there's another way of looking at it; a way that sees science fitting into what George Lings in *Messy Church Theology* (BRF, 2013) describes as the DNA of Messy Church – 'hospitality, creativity and celebration'.

That's an interesting choice of words. The oft-used phrase 'DNA' reveals just how much science talk has slipped into the way we describe and see the world. We may not understand precisely what DNA is in scientific terms – the chemical that is at the heart of all life on earth, including nearly every cell of our bodies – but we at least have a sense that it defines in part who we are; what colour eyes or hair you have, and whether you look a little like your Nana Ethel! Yet despite this use of scientific language in our culture and even within the life of the church, science is not always something that finds a welcome within church life. We lose something because of that, for it is just as much a part of human creativity as art, music and drama – a gift from God, expressing what it means to be human and allowing us to explore creation and perhaps catch a glimpse of the creator.

Messy Church doing science

My own journey into the world of science began when I was five or six in the mid-1960s. At school we watched a black and white TV broadcast of what must have been a Gemini rocket launch – the precursor to the Apollo moon landing programme. These events of my pre-teen years got me firmly interested in science, initially space and astronomy, and eventually led me into a career in weather and climate science. Maybe it was the start of my own journey that

enabled me to listen to the voice of a six-year-old who said, ‘You’re Dr Dave. I can’t wait until I am old enough to come to the Messy Science Lab.’

She had been coming along to our Messy Church for a while where, like a few other Messy Churches, we had been offering simple science experiments to some of the older children who were a bit bored with the usual craft activities. Seeing this young girl’s excitement over joining in the experiments, we opened up the lab to the younger children. Now, each month ten to fifteen families with children aged from five to ten come along to the ‘Messy Science Lab’ led by Dr Dave in his white scientist coat.

A recent survey across the Messy Church network reveals that this journey parallels the experience of others who are using science as part of their local Messy Church. You don’t have to know a lot about science to do this. People running the science experiments have a range of scientific expertise – from very little training up to those engaged in research. Our hope is that the experiments in this book will enable others across the family of Messy Church to have a go themselves, helping families to discover that science is welcome in the world of faith. Through its creativity, we want to enable families to enjoy the wonder of creation and to celebrate that wonder, encountering the one who shapes it.

The DNA of Messy Church science

So, how might science fit within the DNA of Messy Church?

Science and hospitality

Sadly for me, an interest in science from a young age meant that I did not find church very welcoming. In my teens I left church behind, only reconnecting later when I began to explore the interaction of science and faith further at university. This is the sphere of apologetics, which is often not seen as a ready fit for sharing with families and younger children. But including science within Messy Church says to these families that science is indeed welcome in the church, and that those who are fascinated by it are welcome too.

Throughout this book there are stories from scientists who are Christians detailing their own journey with science and faith. Allowing families to meet Christians who are interested in science within local Messy Churches will enable

them to encounter such stories more personally. Adults coming along to the Messy Science Lab I run often express surprise that someone of faith is interested in science, challenging the popular notion that science and faith cannot fit together in a personal and relational way. This can be of real significance as people explore faith in Jesus.

Science and creativity

Church life and worship have always used music and art in helping people to encounter and express their relationship with God, sharing in the creativity of God as beings made in his image. As we grow through the education system, in our teenage years we often have to make a choice between ‘arts’ and ‘sciences’, leaving people with the feeling that they are good at one or the other. Science is often seen as a matter-of-fact exercise, explaining how things *are*. Yet it too is an activity that expresses human creativity, whether through using our skills to operate equipment to undertake an experiment, or using our senses to explore what is happening in the experiments, or using our minds to describe, question and explain. Science is a playful activity that enables us to share in the playfulness of God in creation, expressing in our lives today the story we read at the start of the book of Genesis where God invites Adam to give names to all the animals.

The important thing about science is not getting the right answer. More important is asking the right questions. I often ask the families to explain what is going on in an experiment. Explanations offered are often imaginatively creative, if not always right – but many of the explanations that science has come up with through the centuries have been wrong too! This captures the essence of science that those who work within the world of science will recognise. Messy Church science allows children and adults to grow in confidence. Children are offered the chance to discover an interest in science and begin to understand how science explores the world in a methodical way. And for adults, who perhaps left science behind in earlier years thinking it was too hard for them, it provides a second chance to discover it afresh, and perhaps an ability to enjoy science with their children as they grow. For all, it helps them to discover a little more of the people who God has made them to be, and hopefully more of who God is.

Science and celebration

Children grow up encountering science from a very young age in our culture – in school, through technology and the media, both in factual programmes about the world and imaginative science fiction. Recent research suggests that

children who do not grow up with a faith often express their natural sense of spirituality in the language of science. This is often lost in young adult years when our educational system takes a more rational approach to science, stressing a separation from faith. Using science in creative ways to explore faith provides language that fits to children's wider view of the world, shaping faith and hopefully planting at least a memory that, as they grow through their young adult years, will counter the notion of the opposing natures of science and faith.

Many people who are a part of Messy Church come from unchurched backgrounds. Exploring the stories of the Bible and Jesus in creative ways is part of the way Messy Church helps people come to faith in Jesus. Each of the science experiments contains suggestions as to how they might relate to a Bible story, providing an illustration or reinforcing the core message of the session. But, as with other approaches seeking to help those unfamiliar with the traditional stories of faith – such as Godly Play – more reflective, open questions in response to the experiments will also help people to encounter God, much as many people feel a connection to something beyond themselves when they ponder the beauty of creation. Connecting what people see in the experiments to prayer is another way they can be helped to connect with God, individually and in corporate worship. This can feel a bit risky. Ideas of God arising from such reflective activities may not fully match the God who is revealed in Jesus, needing to be balanced by more direct explanation of biblical material. However, it gives space for the Holy Spirit to be at work in drawing people towards Jesus, reminding us that we are working in cooperation with God, who is present in the whole of creation and life.

Doing Messy Church science

This book offers 100 outlines of experiments under ten different topic headings. We do not suggest that you run an entire Messy Science session of ten activities at a time, unless of course you particularly wish to have a special science focus! Rather, these ideas can be selected from as desired in order to add a scientific element to the proceedings – using one or possibly two activities from the book within each session. To help you choose experiments, each comes with a 'Mess', 'Danger' and 'Difficulty' rating marked out of five. If you are unfamiliar with running science within Messy Church, we recommend you begin with some of the simpler experiments. Children are fascinated by trying experiments with their own hands and discovering something new, without them having a

dramatic ‘wow’ factor. But do not be put off by some of the more difficult and risky experiments. Having a ‘wow’ factor every so often will keep their attention!

The experiments have been designed so that they can be used by people with little background in science and to fit within the timeframe of the activity section of a typical Messy Church (20–25 minutes). Each comes with a list of equipment needed, most readily available in shops or which can be found around the home and lying around a typical church. There are some that will need more specialised equipment – such as strong bar magnets, electrical cables and fittings, prisms, diffraction gratings and microscopes. These can be sourced cheaply through a variety of internet outlets.

Step-by-step instructions on how the experiment is to be carried out are also provided to help it go well, although science does not always go to plan! While the experiments have been trialled, and you are encouraged to try them for yourself before going live in a Messy Church session, at times experiments will not go as expected, often because of mistakes in following the method, but do not be discouraged. There will always be something to talk about and learn and, in any case, some of the greatest scientific advances have come about through mistakes!

In each experiment, ‘Big thinking’ explores in a simple way some of the science behind the activity. Some also have links to additional material on the web, which may help you understand and explain the science background of the experiment; you might want to encourage families to explore these later. Some of the experiments have additional take-home items that can be used in the celebration together, as well as allowing families to continue to explore the science and theme of the Messy Church session at home.

As you do the experiments, don’t just focus upon the outcome alone. You might want to ask people why we do the experiments in a particular way or what they expect to happen – which can lead to those ‘wow’ moments when something different actually happens! Encourage the children to chat with family members and leaders about what they are doing and seeing, and encourage them to explain what is happening in the experiment. Remember, getting the answer right is not always the most important thing. Creativity, imagination and just having a go are. In the ‘Big questions’ section of each experiment there are also links to Bible stories, Christian festivals and suggestions for reflective or prayer activities. Ensure that you leave time for this – sometimes it can be easy for the excitement of the experiments to take over!

Most of these experiments are deemed to be low risk. But for some, caution is needed, especially those using heat, electricity, chemicals, bright light sources and material that might be tasted or eaten. Ensure that you think through any risk issues before using the experiment and what steps might be needed to minimise risk, such as ensuring good adult supervision. A few specific issues to be aware of:

- Some experiments require products you can find around the home that come with childproof tops – such as bleach or methylated spirits. Please read the safety information before using them. Be particularly aware of those that cause irritation to skin, airways and eyes, or are dangerous if ingested. If you use such material, it is advisable to ensure participants wear disposable vinyl gloves and keep their arms, legs and feet covered. Eye goggles are also advisable – and make sure the church's first-aid kit contains equipment for washing out eyes. Please ensure that the outcomes of such experiments are not taken home, as risk cannot be controlled once they have left the Messy Church session.
- Similarly, some experiments require more specialist chemicals which can be sourced from the internet. Some suppliers provide good safety advice with the product. Others do not, and you may need to search on the internet for health and safety advice. Again, use of disposable vinyl gloves and eye goggles is recommended and experiments should not be taken home.
- A few of the experiments involve tasting various substances. Please check possible allergy risks in these cases, as well as anywhere substances might come in contact with exposed skin.
- Do not allow children to touch equipment linked to mains electricity. All electrical equipment used should be PAT tested.
- Children and adults should not look directly at bright light sources – such as a laser source – with their eyes or through a lens. This is particularly true of looking directly at the sun, which will cause permanent damage to eyes. This is worth saying twice – NEVER LOOK AT THE SUN DIRECTLY.

If you have not done science experiments before in Messy Church, it is advisable not to try the higher-risk experiments first, no matter how tempting that might be! You could instead try them out first as a demonstration. The few experiments that are suggested as 'Demo only' are clearly marked as such under the 'Danger rating'. You should not allow children, even with adult supervision, to undertake them.

Tree rings

Ratings



Theme

Trees are good for time travel – they are a record of what conditions were like in years gone by

Equipment needed

Tree trunk; magnifying glasses; small nails 5–8 cm long; sticky labels; hammer (any size will do); pens/felt-tip pens; sticky tape

Before you begin

Why do trees have rings? The paler wide rings show fast growth, and are made of bigger cells. The darker narrow rings show slow growth and are made of smaller narrower cells. These rings can be seen using a magnifying glass. Each pair of dark and light rings is a year's worth of growth. To make this activity worthwhile, you'll need a trunk with at least 40 rings.

Experimental method

This is an expedition into memory. The last ring was when the tree was cut down, so label this outer ring (not the bark) with the year the tree was cut down. Get people to write their year of birth and name on a label. Stick the label to a nail and hammer it into the correct ring. (See photos online.)

What events can they remember: year of marriage? Year they moved house? Year they started school? Year they took part in the pantomime? Write the event on a label and nail it into the correct ring. You now have a timeline of your participants' lives!

Big thinking

Why are the rings different sizes? Use the magnifying glass to check that the cells are different sizes. What might make the trees grow quicker in the summer and slower in the autumn and spring? Will there be any growth during winter? Cold temperatures will make the plants grow slowly, whilst warmer ones will speed up growth.

Big questions

When do we grow best? What sorts of things help us? What about our spiritual growth? Or how do we grow more kind? Can people see us growing in love? Trees have rings to show how they have grown, so what evidence is there for our growth?



Fruit batteries

Ratings

MESS 

DANGER 

DIFFICULTY 

Theme

Humble things working together can be a source of amazing energy

Equipment needed

Lemons or oranges; zinc pieces (e.g. galvanised nails); copper metal pieces (e.g. copper clout nails or piping); wires; crocodile clips; five-volt LEDs (Maplins code WL28F)

Before you begin

The two metals (zinc and copper) will generate a current if placed in acid. The current will flow from the more reactive metal (zinc) to the less reactive copper. This current is made up of electrons. If you have sufficient numbers of electrons moving, then you can light an LED.

Experimental method

(See photos online.) Cut the lemons or oranges in half. Gently squeeze the fruit to break some of the cells. Pierce one side of the fruit with a copper nail and pierce the other side with a zinc nail. Make sure that the two nails do not touch inside the lemon. Repeat several times until you have at least ten halves of lemon.

Use the wires to attach the copper of one lemon to the zinc of another lemon. This ensures that the lemons all push the electrons in the same direction! Repeat until all lemons are wired up, except for the first zinc nail and the last copper nail.

Attach a wire to the LED. The leg of the 'flat' side of the LED needs to be joined to the first zinc nail, and the other leg of the LED needs to be joined to the last copper nail. The LED should light, albeit dimly. If it's too dim, add more lemons to the circuit between the LED and the last copper nail.

Big thinking

The metals and acid work as a team to bring about a surprising outcome. And with more team members, the result looks brighter and brighter, as long as they push in the same direction.

Big questions

Working with others brings more energy than working by ourselves. Why is being involved with a church, a political party, a team, a class, a band, a family or an orchestra so important? What happens if people start to push against the team's direction?



Growing babies best

Ratings

MESS  DANGER  DIFFICULTY 

Theme

Taking care of each other; nurturing

Equipment needed

Cress or white mustard seeds; cotton wool or kitchen towel; plates (get a cheap set from a local charity shop); water; labels; individual egg holders, cut up from egg boxes; small freezer bags; metal 'twisty' closures

Before you begin

Plants need a variety of conditions to grow properly. This experiment examines how plants grow in different places.

At least a week in advance, place some cotton wool on a plate, make it really damp and add 20 seeds. Do this for several plates and place these in the airing cupboard, in a fridge, on several window sills, outside, under a saucepan, etc. You will need to water these every day, just to keep the cotton wool damp. You might also like to set up a second set which only gets water at the start and at the end. The plants in each condition will grow differently.

Create some labels with each different location, but don't stick them on to the plates.

Experimental method

Bring the plants and the labels to the event. Get people to try to link the plant with the label, and talk about why they made the decision.

Give each participant a cut-up egg box, some cotton wool, around ten seeds and the plastic bag. Ask them how they might make the perfect home for plants. Place the cotton wool and seeds into the egg box, dampen a little, and place into the plastic bag. Seal the bag with a metal twisty closure to stop the bits from falling out.

Big thinking

Plants by a window will grow towards the light. This is called phototropism. Plants in the dark will be etiolated: yellow, grow tall and spindly. Plants with less water will not grow as well, especially in hot weather! Cold temperatures will make the plants grow slowly, whilst warmer ones will speed up growth.

Big questions

How could you grow the perfect plant? Where are you going to place yours? So what are the perfect conditions to grow people? How could you grow better? What stops us growing?



Helping Messy Church leaders use science to explore aspects of the Christian faith



In popular culture there is a perceived conflict between science and faith, yet in many ways scientific understanding can enhance faith. This resource offers Messy Churches the tools to use science to explore aspects of the Christian faith; demonstrate that science and faith are complementary; and enable children and adults alike to appreciate the wonder of creation. These 100 sizzling ideas from a range of contributors provide inspiration for the Bible-based activities element of Messy Church.



Revd Dr David Gregory is Senior Minister of Croxley Green Baptist Church and as 'Dr Dave' leads a Messy Church Science Lab as part of a monthly Messy Church. He has a background in physics, astronomy, meteorology and climate, and continues to take an interest in science, offering talks on connections between science and faith, as well as weather and climate change, to schools, churches and community groups. He is the 2017-18 Vice-President of the Baptist Union.

Visit messychurch.org.uk/science for downloads, updates and more!

The Bible Reading Fellowship (BRF) is pleased to bring you this fantastic resource, which we hope will help you develop scientific understanding and grow in faith. We have been able to develop this project thanks to a generous grant from Scientists in Congregations.

Messy Church is a core part of BRF's overall vision to transform lives and communities through the Christian faith. Although sales of books and resources cover some of the costs of their production, Messy Church is funded primarily by donations, grants and legacies.

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