

Can we be sure?

Limits of confidence in science and faith

*CiS Manchester: The Manchester Science and Philosophy Group
at Café Muse, The Manchester Museum, on Wednesday 18th March 2015 at 6 pm*

Prof. Peter Budd

Professor of Polymer Chemistry, The University of Manchester

**What
is
truth?**

What is truth?

Quid est veritas?

A phrase famously used by the Roman prefect Pontius Pilate,
at the interrogation of Jesus of Nazareth. (*John 18:38*)

What is truth?

A question that's occupied the minds of philosophers down the ages.

What is truth?

What can we really know?

Of what can we really be sure?

Science offers one kind of truth.

Religion, arguably, offers another.

Many things may be subjectively true for an individual.

But how much confidence can we have in claims of objective truth?

Of absolute truth?

Of truth that applies to everything and everyone?

Science, in particular, claims to be objective.

Science claims to say something real about the Universe around us.

Because science has an empirical basis.

It's based on experimental observations.

Observations that can be checked and reproduced

by different people in different places at different times.

But inherent in every experiment is a degree of error.

And scientists are called to make judgements, which may have a subjective bias.

So how much confidence can we have in what might be called "scientific truth"?

And while science, in seeking to be objective, may nevertheless have a subjective component, faith, which is often perceived as purely subjective, also has an objective element.

Faith, which can be defined as having confidence in something or someone,
is often assumed to be

having confidence in something that cannot be proven.

Yet faith may be based on evidence that is in some sense objective.

In the case of a Christian faith, on the Bible.

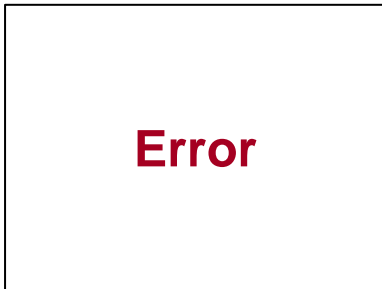
A real book – actually a collection of books – you can take, and hold,
and that everyone can read for themselves.

And faith may make claims of absolute truth.

For instance, that there's a God to whom we'll all be called to answer.

So can we approach those claims of absolute truth,

in much the same way as we seek to understand scientific truth?



What I'm going to do today, is first to talk as an experimental scientist,
about how we deal with error in science.

And then I'm going to talk about whether this has any lessons that can be applied to faith,
and in particular to the question of what does or doesn't constitute
Biblical truth.

I don't claim to have answers to every question.

The purpose is to provoke discussion.

But let's begin with science.

How do scientists deal with error?

With the fact that if I do an experiment today,
and someone else tries the same experiment tomorrow,
we won't generally get exactly the same results.

With every experiment, come's experimental error.

First, we have to be very clear about what kind of error we're talking about.
Because we have to handle different kinds of error in different ways.

If we're measuring something,

there are always small variations from one measurement to the next.

Sometimes it may be a bit more, and sometimes it may be a bit less.

We try to perform the experiment as consistently as possible,
but we generally can't avoid small variations in the results.

**Statistical
error**

This is statistical, or random, error.
And the way to deal with statistical error, is to use statistics.
If we measure something several times and take an average,
the average is more reliable than any single measurement.

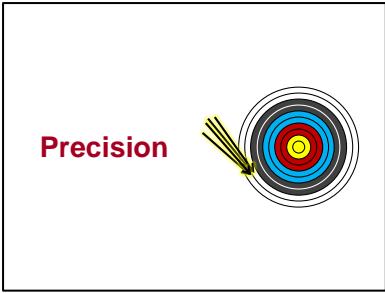
**Statistical error Systematic
error error**

In addition to statistical error,
an experiment may give a result that's always out by some amount,
perhaps because we haven't designed the experiment in the best way,
or because equipment isn't calibrated perfectly,
or because we make simplifying assumptions when analysing the data.

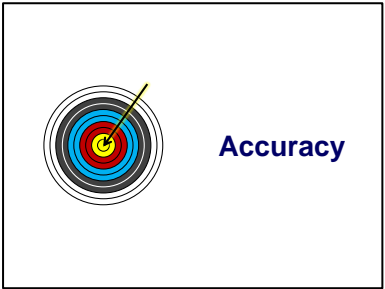
This is systematic error.
Systematic error gives an answer that deviates from the "true" value of something.
But if we don't know what the "true" value is, it can be very hard to spot this kind of error.

Precision Accuracy

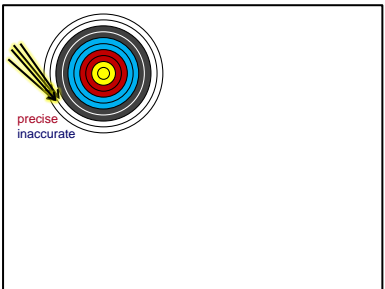
One of the first things we try to teach students in a measurement laboratory,
is the difference between accuracy and precision.
In everyday language, the words "accuracy" and "precision" are often used interchangeably.
But in the physical sciences, they mean very different things.



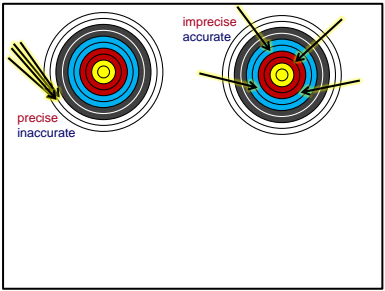
Precision is about the repeatability or reproducibility of something. If we think about an archer firing arrows at a target, precision is about how tightly clustered the arrows are.



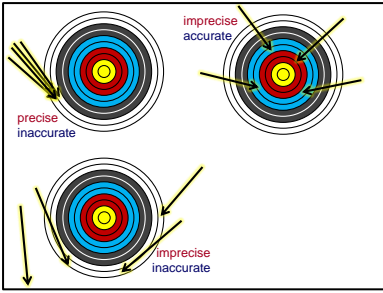
Accuracy, on the other hand, is about how close we are to the “true” result. If we think about an archer firing arrows at a target, accuracy is about how close to the bulls eye the arrows are. An archer may be:



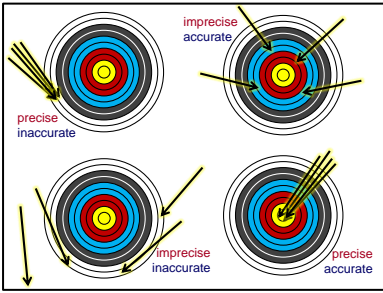
precise but inaccurate,



accurate but imprecise,

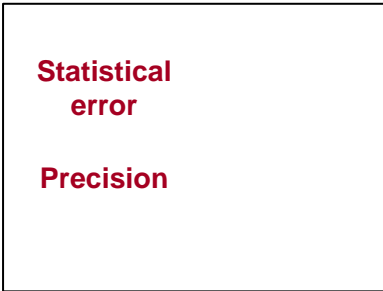


neither precise nor accurate,

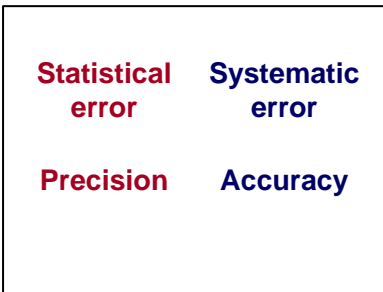


or – what we really want – both accurate and precise.

In terms of statistical and systematic error,



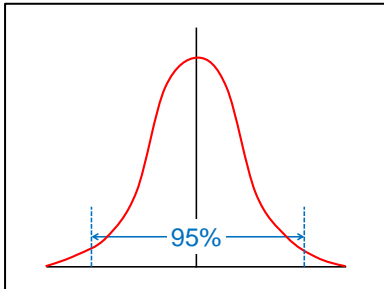
precision is linked to statistical error,
and can usually be improved by doing things again and again,



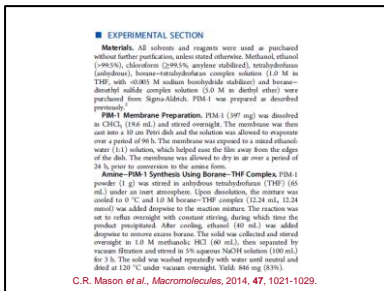
but accuracy is limited by systematic error.
It can be hard weeding out systematic error,
but we do all we can to consider every possible source of error,
and keep it to a minimum.

And, wherever possible, we try to confirm our results,
by comparison with other techniques, other methodologies.

All this means scientists have to be cautious in the claims they make.
When we report the results of an experiment,
we always – or at least we should always – indicate the precision of the results.

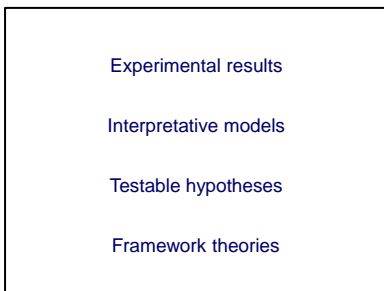


We may do statistics and quote a confidence interval,
indicating we're, say 95%, confident that something is in a certain range.



And when we report the results of an experiment,
we provide a complete description of our experimental procedure,
so others can judge how much to trust our results.

But science isn't just about the results of experiments.

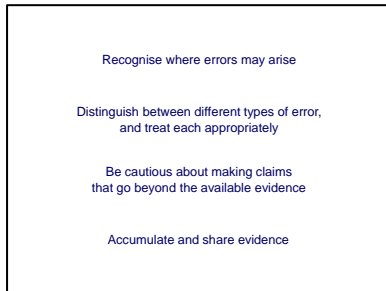


It's also about the models we use in interpreting those results.
About the hypotheses we seek to test.
And about the theories that reflect our understanding of the universe.
And our confidence in these things depends on how much evidence we have to support them.

In testing a hypothesis or examining a theory,
we have to weigh the accumulated experimental evidence.

And there are judgments to be made, which may have a subjective bias.
So different individuals may draw different conclusions.
But science is a corporate activity.
Results are shared with, and our ideas tested by, our peers.
And while our peers can sometimes be frustratingly slow to get the point,
when many of our peers come to share our ideas,
it gives us confidence we're on to something meaningful.

So here are some key points about how as scientists we tackle error:



Firstly, we recognise where errors may arise.
Secondly, we distinguish between different types of error, and treat each appropriately.
Thirdly, we are cautious about making claims that go beyond the available evidence.
Fourthly, confidence comes through the accumulation and sharing of evidence.

So, in science, can we be sure?

Well, we can be sure enough.

We're always willing to re-examine things when new evidence comes to light.

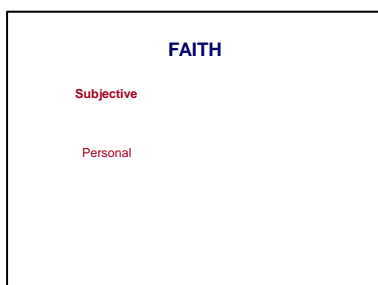
But we can be sure enough of the things that matter.

Of the things that matter when we put science to use.

We can be sure enough.

Sure enough to be able to design aeroplanes that fly,
drugs that heal people,
electronic devices that work,
and, in my case, polymers that suck up certain molecules.

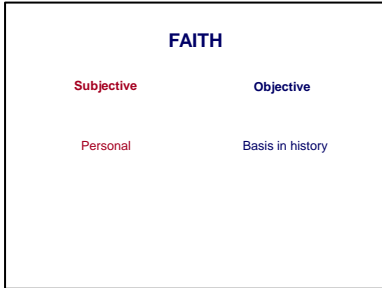
So, if that's science, what about faith?



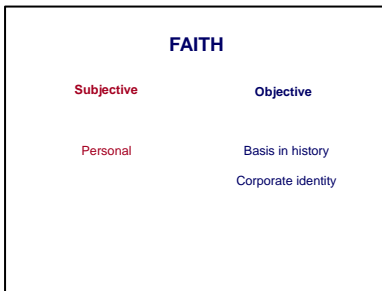
Now, individuals may have profound experiences and powerful emotions,
which give them a deep certainty about their particular
religious, philosophical or cultural belief system.

And in the case of a Christian faith,
 at the heart of which is a love affair
 – a loving relationship with God through Jesus –
 assurance comes in large measure through experience.
 And nothing I'm going to say negates the importance of that personal form of faith.

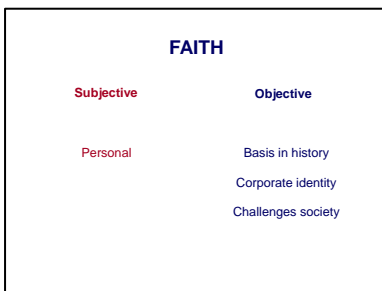
But faith is not purely subjective and faith is not just about individual experiences.



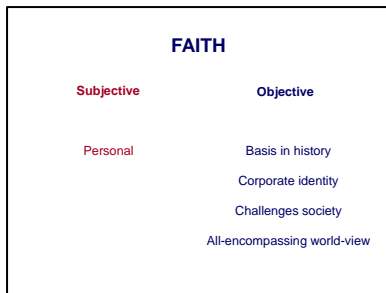
It may claim a basis in history.
 In the case of Christian faith,
 in the birth, life, death and reported resurrection of Jesus of Nazareth,
 two millennia ago.



It may offer a corporate identity.
 In the case of Christian faith,
 in a new type of family – the church.



It may challenge the preoccupations and practises of society at large.
 Setting a standard of right and wrong.
 Seeking purity of lifestyle.
 Showing up injustice and unfairness.



It may present an all-encompassing world-view.

Speaking of a God who made all and who will judge all.

It may make promises that go way beyond this existence.

Offering life beyond this life.

And in all these things, it's reasonable to ask

“Can we be sure?”

Not just “can we feel sure for ourselves?”

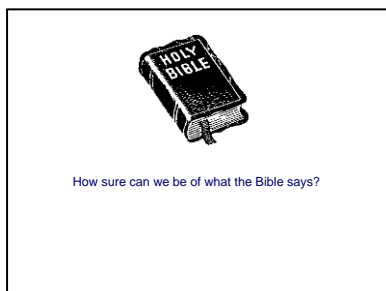
But can we marshal enough evidence to be sure.

Or, at least, sure enough.

Here, I shall talk specifically about Christian faith.

And, since there are variations of Christianity that differ in their view of what is authoritative,

I shall focus in particular on the question of how sure we can be of what the Bible says.



Now, some people simply laugh at the idea that the Bible might be taken seriously.

For them, it's an outdated, outmoded, unbelievable load of tripe.

Others, myself included, think one should at least examine the Bible's own claim that,

as Scripture, it is in some way “God-breathed” or “inspired by God”. (*2 Timothy 3:16*)

And if it is: since God by definition can't be wrong, the Bible can't be wrong.

The term sometimes used, is that the Bible is “inerrant”.

“Inerrant”, at least, in its original form.

But that immediately raises all sorts of questions.

We don't actually have the original manuscripts.

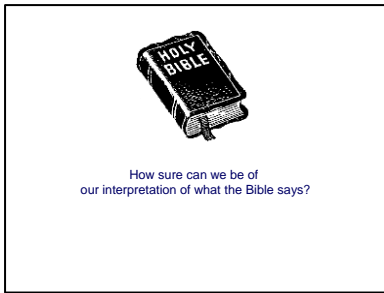
And there are at least minor variations between the manuscripts we do have.

And even those who claim the Bible is inerrant,

all too often disagree vehemently about what it actually says.

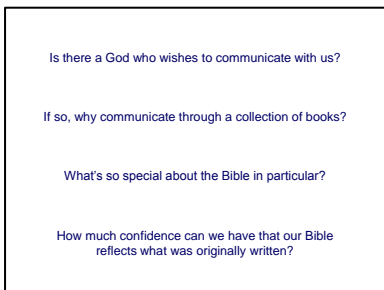
So, if we're going to approach the Bible honestly,

we have to accept that error may creep in to our understanding of it.

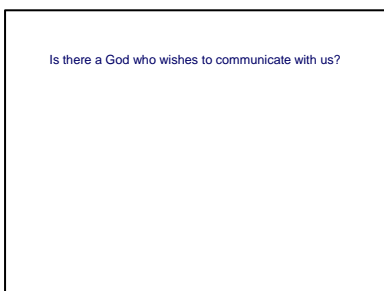


In which case, how do we deal with that?
Can we be sure?
Or, at least, sure enough?

But before we talk about error in Biblical interpretation,
perhaps we should briefly consider some other questions.



Even if we accept the hypothesis that there's a God who wishes to communicate with us,
why should he communicate through a collection of books?
And since there are other books for which divine inspiration is claimed,
what's so special about the Bible in particular?
And if we take the various forms of the Bible we have today,
how much confidence do we have that they reflect what was originally written?



Let's start with the hypothesis that there's a God who wishes to communicate with us.
And one thing we can say for sure, is that we can never be sure there's no God.
Because we can't prove a negative.
Or at least not that sort of negative.
And if there is a God, and if that God has any desire to communicate,
then potentially that's the most important thing we'll ever need to know,
so it's worth putting effort into exploring the possibility.

Is there a God who wishes to communicate with us?

If so, why communicate through a collection of books?

There are many ways in which a God might communicate,
so why should we focus on the written word?
On a collection of books, albeit springing from an oral tradition.
Books with human authors, human writers.

The great thing about a book, is that it's there for anyone to pick up and read.
Or perhaps, nowadays, download and read.
Even if we can't read for ourselves, we can listen to it being read.
It's something objective we can all refer to.
A voice or a vision is highly subjective, is hard to test.
While a book can be shared, examined, discussed.
Voices and visions have their place; indeed, are a key part of the Biblical narrative.
But when they're written down, we can see them in a wider context.
We can check and compare and contrast.

Is there a God who wishes to communicate with us?

If so, why communicate through a collection of books?

What's so special about the Bible in particular?

But if there's a God who wishes to communicate with us,
and if that God communicates, at least in part, through books – through Scripture –
what characteristics might those books have?

As a Scientist, what I look for in the Universe is consistency.
I expect the Universe to behave in such a way,
that if I do an experiment here today,
and someone else does the same experiment at another time in another place,
we'll get the same result, within the margins of experimental error.
And, if there's a God who dreamed up the Universe, I expect consistency.
A faithful, unchanging God.
And if that God provides us with a collection of books, I expect consistency.
Internal consistency – that it doesn't contradict itself, when considered in its own terms.
And consistency with what we know of the world and of human behaviour.
And when I read the Bible, I see a consistent story that unfolds through the generations.

I see real people, with their strengths and their weaknesses,
people who may have lived in another time and another culture,
but who reflect the experiences of people today.

And if God is going to inspire a collection of books,
it has to be meaningful to all sorts of people, in all sorts of situations,
at all times in history.

So it will use a variety of styles, to suit all personalities.
History. Poetry. Argument.

It will use forms of communication that are common to all cultures,
in particular, story-telling.

And in the Bible, it seems to me we truly have the greatest story ever told.

And if God is going to inspire a collection of books,
I expect him to use a great variety of people.

I'm suspicious of any single individual who claims,
"I, and only I, have a unique revelation from God."

The Bible's central character – Jesus – didn't write a single word.

And in many ways he was remarkably reticent in the claims he made for himself.

What we have is multiple eye witness accounts of his life.

And of what went before.

And of what immediately followed.

And if God is going to inspire a collection of books,
I expect it to be balanced.

There's an unfortunate human tendency to take hold of an apparent truth,
and push it to the extreme where it becomes a falsehood.

But any God who is worthy of the name will hold truths in balance.

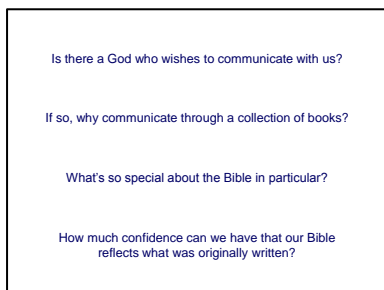
Justice balanced with mercy.

Beliefs balanced with action.

And so on...

And in the Bible, what some sometimes perceive as contradictions,
I see as perfect balance.

To me, at least, it seems the Bible has all the hallmarks that Scripture should have.



But if we take the various forms of the Bible we have today,
how much confidence do we have that they reflect what was originally written?

We don't have the original manuscripts.

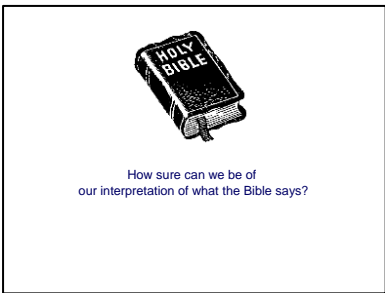
But compared to other historical documents, we do have an enormous wealth of material.



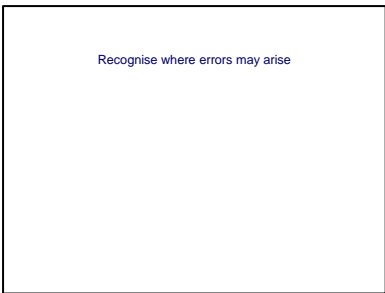
You can go to the John Rylands Library in Manchester and see a fragment of papyrus from early in the second century AD. On it, in Greek, are bits of the 18th chapter of John's gospel. Part of verses 31-33 on one side, verses 37-38 on the other side.

Anyone who knows classical Greek can recognize it. Because the content of the Bible has been passed down to us remarkably accurately, through the centuries.

There are variations between manuscripts, variations of spelling and grammar. But we can be confident what we have is pretty close to the original.



But even if we accept all that, how much confidence can we have in any interpretation? And what does it mean to say the Bible is “inerrant”, given that people can understand it in quite different ways?



Following the approach a scientist takes, first we can ask “are there errors that may arise?” And the answer has to be “yes”. Because there's inherent ambiguity in any human language. Anyone in my position who has to deliver a lecture,

and then to mark the examination papers of those who attend, knows that however hard you try to phrase something as clearly as possible, some people will always find alternative ways to understand it.

Recognise where errors may arise

Distinguish between different types of error,
and treat each appropriately

So, following the approach a scientist takes,

we next can ask “given that errors may arise, what sort of errors are they?”

If we think about accuracy and precision, the nature of language limits precision.

That doesn’t mean it’s inaccurate.

That doesn’t mean it’s wrong to call the Bible “inerrant,”

so long as we understand “inerrant” to mean

that it contains accurate information about what God wants us to know,

and so long as we don’t try to force our own questions on it.

But it does mean when handling what we might call the “theological data” of the Bible,
we should take as much care as a scientist does with their experimental data.

Recognise where errors may arise

Distinguish between different types of error,
and treat each appropriately

Be cautious about making claims
that go beyond the available evidence

So, following the approach a scientist takes,

we’ll be cautious about making claims that go beyond the available evidence.

I often have to warn my students about over-interpreting data.

It’s so tempting, when you have a little information,

to extrapolate, to infer, far more than is strictly justified.

If we’re honest and rigorous in an approach to the Bible,

we’ll recognise the imprecision of language,

and we’ll accept there’s a degree of uncertainty about some things.

When someone says “The Bible says…”

We’ll check carefully, and ask “Does it really say that?”

When someone says “This is how you must understand this or that bit of the Bible!”

We’ll check carefully, and ask

“Is that really the best interpretation, given the available evidence?”

When people suggest there’s some kind of conflict between science and Biblical teaching,
it generally seems, to me at least, that the arguments are

about things which can be classed as what the Apostle Paul called

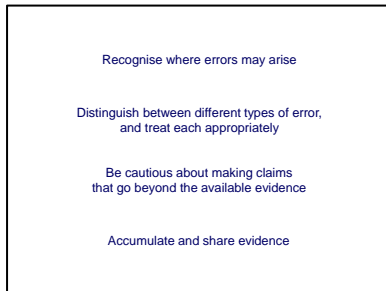
“disputable matters”. (*Romans 14:1*)

They’re within the noise in the data.

And the Bible has far more important things to say.

Because, according to my understanding, the Bible doesn't just state truth,
but points to one who claims to be the truth. (*John 14:6*)
Jesus of Nazareth.

So when it comes to what really matters,
what you might call the signal, rather than the noise,
how much confidence can we have in what the Bible says?



Well, following the approach a scientist takes,
confidence comes through the accumulation and sharing of evidence.
Simple, linear arguments about such questions as “Is there a God?”
are not, for most people, convincing.
What is much more convincing, is when multiple strands of evidence come together
to create a coherent picture.
That’s how science most often works.
If one of my students synthesises a new polymer,
there’s rarely one experimental technique that unambiguously confirms the structure.
Rather, a host of methodologies must be applied
– NMR, IR, UV, elemental analysis and more –
before we’re convinced.
And so with the Bible.
Conviction comes when we see an overall picture that makes sense.
That’s not only internally consistent,
but that also makes sense of the external evidence.
And, as in science, getting to that point takes time, effort and honesty.
It takes careful testing and checking, and offering ideas up to the scrutiny of our peers.

So, when it comes to the Bible, can we be sure?
We each have to examine the evidence for ourselves.
My conclusion is, we can be sure enough.
Sure enough of the things that matter.
Sure enough to want to know more about Jesus of Nazareth.
Sure enough to seek a personal faith in him.

But over to you, for peer review.