2019 Unbelievable Origin of Life discussion video transcript

Can chemistry crack the mystery of the origin of life? Justin is joined by Perry Marshall who has established the $10m Evolution 2.0 Prize for anyone who can show a natural explanation for life. Lee Cronin of Glasgow University is confident that his experimental research could win it. Denis Noble also joins the conversation as they discuss the nature of life and whether current evolutionary theory can account for its origins.

00:01
[Music]
00:02
can chemistry cracked the mystery of the
00:05
origin of life that's our question today
00:07
how on earth did life begin we're quite
00:10
literally asking that question on the
00:13
show how did inorganic chemicals in the
00:15
primordial soup of early Earth become
00:18
living systems capable ultimately of
00:20
developing into human intelligence three
00:23
distinguished guests with different
00:25
perspectives joining me on the show
00:25
today they're all keen to find an answer
00:28
to this going to be joined by Lee Cronin
00:31
on the show today he's Regis chair of
00:32
chemistry at the University of Glasgow
00:35
he and his research team have pioneered
00:36
new chemical experiments seeking to
00:39
effectively sort of fast forward the
00:41
conditions on earth that may have gotten
00:43
life going he's going to explain why he
00:45
believes understanding chemistry is the
00:47
key to this mystery
00:49
Dennis Noble is a noted Oxford biologist
00:52

who's been critical in some ways of the
00:53
neo-darwinian view of evolution three
00:55
years ago he organized a conference at
00:57
the Royal Society exploring new Third
00:59
Way trends in evolution and he's got an
01:02
interest in this area Perry Marshall is
01:04
the sort of person responsible for
01:06
bringing this show together today he's a
01:08
got a background in computer science
01:09
he's something of an entrepreneur and he
01:12
believes that understanding where
01:13
biological information came from is the
01:15
key to the origins problem he's
01:17
established a $10,000,000 evolution 2.0
01:21
prize for anyone who can crack the
01:23
mystery of how life got started so can
01:27
we fight a purely naturalistic
01:28
explanation for the start of life is
01:31
there may be room for a guiding hand
01:32
beyond merely physical processes that
01:34
might come into our conversation be very
01:36
interested to hear the perspectives of
01:38
my three guests on the show today
01:39
so welcome along Lee Dennis and Perry
01:42
perhaps Perry will begin with you
01:45
because you sort of suggested this
01:47
meeting of minds today do you want to
01:50
tell us firstly about the problem first
01:52

of all the origin of life issue and
01:54
about this big cash prize you've
01:56
organised for anyone who can crack it so
01:59
I went down the rabbit hole of where did
02:02
life come from about 15 years ago and I
02:05
started investigating evolution and I
02:09
found that while evolution was a
02:11
incredibly complex in detail
02:13
subject where did life come from was
02:18
actually much simpler
02:20
and it was simpler in the sense that
02:23
nobody knows where it came from there's
02:26
lots of stories there's lots of theories
02:28
in fact one time I was listening to an
02:32
NPR program and Richard Dawkins was on
02:36
and somebody called in on the phone and
02:38
they said so where did life come from
02:40
and Dawkins said it was a happy chemical
02:43
accident and I listened to that and I
02:47
thought did he actually say that and
02:51
does he actually believe it expect us to
02:53
believe that that's a scientific theory
02:55
and he's a professor of the public
02:58
understanding of science and I felt that
03:02
it was really an anti scientific answer
03:04
and I started reading origin of life
03:08
books and I was disappointed at the lack
03:11
of rigor and the willingness to really
03:14

just kind of go along with a certain
03:16
amount of fiction and so on the other
03:22
side I was very sympathetic towards the
03:27
intelligent design view and I really
03:29
embraced that for a while and I had a
03:32
great God of the gaps argument but over
03:35
time I started to feel that if you just
03:39
said God did it and that settles it you
03:42
haven't really settled anything and
03:44
you've really damaged science as well
03:48
because a scientist can't say well God
03:52
did it let's put that in a paper and
03:54
let's go out to lunch and so what I
03:57
decided to do was create a technology
03:59
prize because these kind of prizes have
04:03
been very successful in other fields
04:06
they brought a huge breakthrough in
04:08
spaceflight for example and I said you
04:12
know let's put money on this thing and
04:14
let's get people really trying to solve
04:15
it and so at the Royal Society in May we
04:18
announced a 10 million dollar prize it
04:21
was announced at the Financial Times
04:25
website and
04:27
we've had other media outlets cover it
04:29
and we're looking for an answer it's
04:32
fascinating and Perry you're the kind of
04:34
guy who I can just see instigating this
04:37

kind of a search and putting some money
04:39
behind it Dennis you've endorsed this
04:42
prize yourself you're one of the judges
04:44
I think as well what tell us a little of
04:47
your background firstly and why the
04:49
origin of life issue has become such an
04:51
object of fascination to you yes I will
04:54
start by making a very simple factual
04:57
observation hmm I suspect that many of
05:01
your listeners will think that life
05:04
depends entirely on DNA hmm that's one
05:08
of the molecules that contributes to our
05:11
genetic inheritance now tell you an
05:14
interesting fact if I could take the
05:17
complete DNA out of one of your cells
05:21
and I put it in to a petri dish that's
05:24
the kind of dish that people use to
05:26
study bacteria and other little bits and
05:29
pieces so we put it there with as many
05:32
nutrients as you wish I could keep it
05:36
for 10,000 years and it would do
05:38
absolutely zilch hmm DNA as a molecule
05:42
is one of the most inert RNAs which are
05:47
formed from the DNA template they're
05:50
more interesting mmm they can actually
05:52
be catalytic as the chemists will say
05:55
they can actually make two molecules
05:57
interact with each other faster than
05:59

they would otherwise do that's a key you
06:01
need that to have any living system to
06:04
make things go in a particular kind of
06:07
way now what that means to me is that is
06:12
extremely unlikely really unbelievable
06:16
if the DNA was there at the beginning
06:19
right and that's that's one of the
06:22
reasons why just incidentally I think
06:24
your other guest Lee I know Lee Cronin
06:28
is on the right track okay
06:30
by not starting with DNA but starting
06:33
with what are called polypeptides
06:35
these are little molecules connected
06:39
together called amino acids
06:41
it's not worry too much about the
06:42
technical language the key to them is
06:45
they're very good catalyst if their
06:47
shape is right and so I think he's right
06:50
okay well I think we'll we'll obviously
06:53
dig into this as we go along and I want
06:55
to sketch out the you know the big
06:57
picture first of all for listeners of
06:59
what's at stake here and why this has
07:01
obviously foxed so many people up to an
07:03
out Lee great to have you on the program
07:05
today
07:06
I should say when you walked into our
07:08
studio you were like oh oh it's a
07:10

Christian Rite station is it I think and
07:13
if that wasn't made entirely clear in a
07:16
previous correspondence I I apologize
07:18
but but I'm taking it you don't have any
07:20
religious views yourself or faith to
07:23
speak of in that sense no I mean I'm I'm
07:27
I'm a scientist
07:28
I like evidence and I like to have
07:31
discussions where I can have arguments
07:33
about evidence that doesn't mean I don't
07:34
dismiss people who don't argue of
07:37
evidence but we that's a different
07:38
system so well I'm all in favor of
07:41
evidence - yeah so I think you can agree
07:43
that I know have many Christian friends
07:45
who have brilliant scientists yeah being
07:47
religious doesn't stop you from using
07:49
evidence it just means that you have
07:50
another belief system there as well okay
07:53
that maybe not specifically scientific
07:56
evidence a special I mean we all have
07:57
belief systems whether we declare them
07:59
or not mr. Parmar discussion earlier I
08:01
mean I think this whole question is
08:03
really interesting because of course
08:04
there is a mystery right we're kicking
08:06
things down and I would like to make a
08:07
couple of sessions or a couple of
08:09

comments yeah we there is an evidence
08:13
that there was a thing called the Big
08:14
Bang right we can argue about that and
08:16
then after that Big Bang there was stuff
08:18
in the universe and that energy
08:20
crystallized if you like into hydrogen
08:23
that hydrogen then crystallized into
08:25
stars right those stars burnt exploded
08:30
and produce carbon and that carried on
08:33
we produce some heavy elements and we
08:34
have some planets and there's material
08:37
those planets turned into biology I
08:40
would like to make an assertion I agree
08:42
with Perry about the the being annoyed I
08:46
think confused by the assertion that
08:49
life was a happy chemical accident I can
08:51
tell you that if we haven't proved
08:54
and I think we might have already done
08:57
this in the lab and say that the
08:58
emergence of life in chemistry is
09:01
inevitable as the emergence of stars hmm
09:04
in a universe where there's matter now
09:07
we understand that gravity produces
09:09
stars now we need to understand what is
09:12
the gravity in chemistry that produces
09:15
life and that is partly what I've come
09:17
here to kind of tell you about today
09:19
it's really exciting because we've had
09:21

some breakthroughs in the last few weeks
09:23
actually oh really and I want to push
09:25
parry on the criteria for the prize okay
09:27
so you think you're in with the chance
09:28
of this ten million dollars do I think
09:30
will win it if it's if he's got the
09:32
right if he's willing to give it right I
09:37
mean like that but that's the discussion
09:39
we can have and I'm pretty I'm really
09:41
excited because you know I take my hat
09:42
off in to Perry he's seen a gap
09:44
identified a problem I'm going to take
09:47
that put that prize at face value and
09:49
try and do my best to win it
09:50
Oh we'll get kept Perry Perry back on
09:53
about that in a moment's time just
09:55
sketch out the big picture here because
09:57
a lot of people assume okay maybe they
10:00
learned this in GCSE biology or
10:02
something but you know
10:03
okay so there's kind of some kind of
10:05
primordial soup millions of years ago on
10:08
the surface of Earth chemicals swimming
10:11
around maybe bolts of lightning going
10:14
off and somehow something happened and
10:17
poof you've got your first sort of very
10:21
simple cell or something swimming around
10:23
in the ocean okay that's that's the my
10:27

GCSE vague recollection of what might
10:29
have been explained as how life got here
10:31
what is that view essentially correct or
10:35
fundamentally wrong what's the big
10:37
problem that people have why they
10:40
haven't
10:40
up till now at least being able to give
10:43
a sort of naturalistic scientific
10:45
explanation for for how all those bright
10:48
bits got together to to create light so
10:49
we're really important so you're not
10:51
wrong your GCSE chemistry it's not it's
10:53
not too bad at all but planet Earth
10:56
wasn't just this magic melting pot of
10:57
magical chemicals it's the same planet
10:59
now but it's got life on it and the
11:02
problem we have of looking for life on
11:04
Earth I know the origin of life is
11:06
there's already populated by
11:08
our current biology yes so sales emerged
11:10
and create an ecosystem and there's DNA
11:13
and RNA and bacteria all over the planet
11:15
and they have terraformed a planet from
11:18
bacterial Maps in the ocean to human
11:20
beings burning forests building
11:22
aeroplanes runways so it's very
11:24
difficult to go back and ask where did
11:27
life come from in life is polluting so
11:29

that's the first point but the second
11:31
point I would say that actually there is
11:33
nothing magical about the emergence of
11:35
life it's really simple and what we've
11:37
got to try and do and I really like
11:39
again coming back to the prize and the
11:41
idea of where does information come from
11:44
universes without lit life or universes
11:47
about information hmm okay and I think
11:49
Perry and I really really agree on that
11:51
point but I'll let him comment on that
11:53
in a moment
11:53
so what we're trying to do is we're
11:55
trying to produce a system a chemical
11:57
system that produces his own context now
12:00
I don't like that word and your
12:01
listeners are probably like what do you
12:03
mean by that and it's a bit like what
12:05
happens is the chemistry is random okay
12:08
until a chance event and that's not a
12:12
lucky event that means an improbable
12:14
event on a probability distribution like
12:16
if I play cards I might get a royal
12:17
flush but I'd have to calculate how long
12:20
I have to play randomly yeah once I've
12:22
got that royal flush that rule for us
12:24
doesn't mean to anyone unless I'm
12:25
playing cards yeah but suddenly if that
12:28

royal flush itself created the player to
12:30
recognize royal flush
12:31
you have a feedback loop so actually
12:34
when you then remove the need for magic
12:37
random it's any random okay any random
12:41
event gets trapped in a bubble in a rock
12:44
mmm and that then allows to another
12:47
random event to be slightly less random
12:49
because of what's in that rock because
12:51
you're basically you're taking a coin
12:52
and you've waited it so you get them
12:53
slightly more heads and tails and then
12:55
that coin is able to make other coins
12:57
that's slightly more heads and tails
12:58
before you know it you're only flicking
13:00
heads so what you can do is you can do a
13:02
model and show how many times do I need
13:04
that to happen for I always go from
13:05
heads and tails evens to always getting
13:07
heads and that type of discussion is how
13:11
we create an experiments to create life
13:13
and that's what I was going to ask this
13:15
is essentially what your experiments are
13:17
trying to model kind of flipping that
13:18
coin however many times until yeah you
13:21
well not
13:22
is also getting emergent getting so what
13:25
we're showing in the lab is that we can
13:27

them have random chemicals that emerge
13:29
that make their own code hmm
13:32
but then that code is only a code if
13:33
they can read it there's no point in you
13:35
know if Dennis starts writing he's
13:37
writing in an odd language here I don't
13:38
recognize but if suddenly I'm able to
13:40
start rightly reading that language and
13:42
I can decode it we're onto something
13:45
how are your experiments different from
13:48
the the miller-urey experiment of the
13:50
1950's where you know they basically put
13:52
chemicals and put electric currents
13:55
through them and said oh look we've
13:57
produced some proteins and I think that
13:59
was by and large discredited if I'm not
14:01
mistaken it's not discredit it was
14:02
basically people saying that the the
14:04
miller-urey experiment was like the
14:06
negative pole of a battery it was
14:08
reducing and we need a positive Pole as
14:10
well like a positive so and where's its
14:12
oxidizing and there's lots of arguments
14:14
about that and I think again Perry and
14:16
Dennis are right that there's a lot of
14:17
anthropomorphic kind of we want to
14:20
basically make a life in our mmm and I
14:23
would also back Dennis down a bit say
14:25

it's even nothing to do with me no
14:26
assets what's going on my lab and
14:28
there's one important thing that we're
14:29
doing is we're adding history so what
14:32
we're doing is miller-urey like
14:33
experiments but we're remembering what
14:35
happened hmm all that biology is is
14:37
chemistry with history right now we are
14:40
forced to use DNA as our tape now or
14:44
what we're doing at the beginning is
14:45
showing how we can use the soup to
14:47
remember itself and that's very
14:49
inefficient and it loses memories and
14:51
forgets things
14:52
but over time becomes better at
14:54
remembering if you're better at membrane
14:56
you persist you don't get a raised when
14:59
the comet hits you or whatever else is
15:00
going on on earth and before you know it
15:02
you've emerged your own error correction
15:05
system for your code okay before I being
15:08
Dennis back in Perry do what you want to
15:09
say to this firstly are you willing to
15:12
give this money out if if the conditions
15:15
are met and do you do you think Lee's
15:18
getting along the right lines I mean he
15:19
says at the end of the day it's actually
15:21
quite a simple problem it's not as
15:23

complex as people make out well the the
15:26
prize money is quite real and we've got
15:30
a group of US investors who have signed
15:33
in blood that can write big checks and
15:36
earthling the investor group is actually
15:38
about a billion dollars okay so this is
15:40
small fry is not yeah really our biggest
15:44
problem is just not getting enough
15:46
applicants and not getting enough word
15:48
out there about what we are doing now I
15:51
like what Lee is doing Lee I really
15:54
enjoyed your paper about pathway
15:57
assembly which is where you are
15:59
recognizing the information is a core
16:02
entity to the whole process of life and
16:05
and I I like Sarah Walker of course
16:08
which you co-authored that paper with
16:11
and and just for everybody's benefit
16:14
what pathway assembly says is there's a
16:17
certain minimal set of instructions
16:19
necessary to assemble chemicals and
16:22
certain orders in certain sequences and
16:25
since biology is the only known source
16:30
of agency then if there is a discernible
16:35
pathway assembly then therefore there's
16:37
agency involved and so Dennis and I have
16:41
had a lot of conversations about how
16:43
what this prize really is is it's a
16:46

search for the origin of agency or the
16:49
ability of a system to act in its own
16:52
self-interest and Lee and I met in Santa
16:56
Fe at a Santa Fe Institute event and we
17:01
had a really great conversation and you
17:04
know I like Lee when I read your work I
17:08
feel like I'm dealing with somebody who
17:12
doesn't feel the need to excessively
17:15
fictionalize or romanticize what they're
17:17
doing and I really appreciate that
17:19
Dennis what what's your view over all of
17:22
Lee's project here well first of all I
17:24
like the way he put it because he
17:27
started with that very improbable event
17:30
mm-hmm a Royal Flush I think you cooked
17:32
it and I like that idea
17:35
because it's not saying that the nature
17:40
of that arising is completely
17:43
unbelievably just saying that it has a
17:45
certain probability now I like the sake
17:49
he went on to say because I would
17:52
describe what he was then talking about
17:54
how you move from extremely low
17:57
probability to very high probability
17:59
possibly getting your heart all the time
18:02
or your head all the time and I call
18:05
that harnessing the stochasticity that
18:08
last long phrase harnessing is like you
18:12

harness a hoist in controls it now the
18:15
big difference between people like me
18:18
and the Neo Darwinists who propose that
18:21
there is chance and then just selection
18:24
in my natural selection is that I think
18:27
the chance is used okay and it's used by
18:30
biological systems and you can prove
18:32
that our immune systems are doing that
18:34
now as we talk if a new invader comes
18:39
and invades our body and other virus or
18:42
bacterium that we haven't met before
18:43
what do we do we start playing around
18:46
with the chance down in a particular
18:48
region of our genome to create the
18:51
antibody to that invader but but my
18:52
understanding and forgive me I am
18:55
certainly the layperson is conversation
18:57
was was that you you kind of have to
18:59
have a DNA or something like that for
19:01
evolution to begin you know you've got
19:03
to have that in place for mutations and
19:06
whatever to then be able to to play into
19:08
the system but but you're shaking your
19:10
head at that Lee so what have I got
19:12
wrong there so so I think the really
19:14
interesting thing about evolution in
19:15
life is we don't know what they are yet
19:17
right we have a little bit we have a
19:19

little bit of how they work so I mean we
19:20
know what evolution is in the context of
19:21
biology okay it's a bit like flight so
19:24
before the input if you could imagine
19:26
the world with our Aero planes or
19:28
helicopters and you said to somebody
19:29
what is flight they would look at a bird
19:31
and say well that's fly or a bee or
19:33
maybe a hot air balloon
19:34
but now flight is for me a successful
19:37
flight is going on a playing a Heathrow
19:39
or maybe ending up say if I'm going to
19:41
Arizona in Phoenix right on a 747 and
19:43
flight is defined by a machines that can
19:46
do work to create lift and so we
19:49
actually then have a theory for that so
19:51
the problem we have right now is we
19:52
don't really have a theory for the
19:54
emergence of evolution but we have a
19:56
theory of evolution that operates when
19:58
we already have a memory right and that
20:00
memory is basically DNA and actually
20:01
evolution doesn't happen
20:03
in DNA it happens in cells in
20:05
populations and I think that's something
20:07
that the population biologists have
20:09
really taught me so now I have a
20:11
population of molecules those molecules
20:14

are in different states those molecules
20:16
are partitioned in and out of a cell I
20:19
make salad dressing a lot in my lap and
20:21
the fat salad dressing is probably the
20:23
most important thing for the origin of
20:25
life that is oil in water ok what
20:28
happens when you shake oil in water you
20:30
get bubbles form spontaneously some
20:32
molecules can dissolve in those bubbles
20:33
in different ways and each bubble has a
20:36
different set of molecules in them and
20:38
you can fingerprint that using a device
20:40
similar to what you can make baby test
20:42
your blood to look at them okay
20:44
so if every droplet is different
20:46
something you have individuals if
20:49
individuals are now interacting in those
20:51
droplets or bashing around and that
20:53
salad dressing they can compete with
20:55
each other they can cooperate together
20:58
and they can start to record but we're
21:01
still talking at this point about in
21:02
organic chemistry correct so so and I
21:06
suppose that the thing I'm trying to get
21:07
my head around is is it feels like
21:09
there's a big difference between a kind
21:11
of a chemical which has no sort of
21:13
teleology that it's just is what it is
21:16

and and a system which kind of has this
21:20
trajectory to start replicating and so
21:24
that's a really important point you're
21:26
making so form etiology is what
21:28
teleology is a word i only learned a few
21:30
months ago but actually I now know what
21:32
it means I can record so I would say
21:34
like if I design a fork yes to pick up
21:37
something I know it's a fork if I
21:39
observe a thought arising I look at the
21:41
pathway assembly of the fork and say
21:43
well actually it's below my fresh hold
21:44
it could have emerged mmm but an agency
21:47
built that fork and I can discern the
21:49
number of features so what I mean is at
21:52
you've chemistry is at the border
21:55
between 80 logical if that's a word okay
21:58
and teleology cool system okay and when
22:01
the chemistry is able to create it
22:04
basically is able to affect itself in
22:06
the future that then becomes
22:08
teleological right it crosses over from
22:11
inorganic to organic exactly and that is
22:14
that's really the exciting discovery
22:16
trying to make Perry wants to pay for no
22:19
I mean that in a sense not not just my
22:21
my lab anyone's lab compared he wants to
22:23
see and I'm putting this precisely so he
22:26

can challenge and Dennison challenge the
22:29
abet a self generating system forty
22:32
that's teo giclees generating objects
22:35
and what you're saying is like oh boy
22:37
DNA we've convinced it evolves but how
22:39
did that happen sure I know see
22:41
evolution occurs firstly in bubbles
22:44
right over the bubble so you imagine
22:46
like a massive system disorganized
22:48
chemistry persisting as that persists
22:50
over time it has to compress those
22:52
features and stop errors creeping in and
22:55
what happens over time as polymers get
22:57
formed so what is a polymer polymers
22:59
when two ping-pong balls if you like are
23:01
able to come together and rather bounce
23:03
off one another they connect and then
23:05
it's two ping-pong balls yeah connected
23:07
together so you have double the
23:08
information before and so on and you get
23:10
the kind of daisy-chaining it's
23:13
extraordinary and in a way it sounds
23:14
like what you're saying if if it's
23:15
possible for life to arise it will arise
23:18
correct effectively they're kind of
23:20
principle at work by which that's the
23:23
direction things will go sure if the
23:26
physical conditions are simply possible
23:28

I'm pretty sure by the end of my
23:30
academic career if not earlier will show
23:32
that life the emergence of life is
23:34
inevitable as immersive discovery of
23:36
exoplanet well you're a confident man
23:38
and I guess you need to be when you're
23:39
dealing with these kinds of areas you
23:40
it's it's a sort of like it's like you
23:43
you you believe you got the theory and
23:45
and it's gonna and you're yeah I mean
23:48
the only belief system I have I guess is
23:50
the belief that chemistry is not magic
23:51
so I'm believing there's nothing magic
23:53
in chemistry right right and so I've got
23:55
to set up those experiments and look at
23:56
the emergence just before we come back
23:59
to Dennis Perry just you you say you
24:03
said well this is all about agency
24:05
ultimately and information do you think
24:10
that Lee is got this right that there is
24:13
this kind of simple principle that if
24:16
you you know if the conditions are right
24:18
life will happen because there's this
24:22
I'm not expressing it well here but but
24:25
there's this that the teleology will
24:27
kind of kick in as as the different
24:29
ways in which it can be expressed kind
24:31
of a in all these different combinations
24:33

what what you beyond that Mary I don't
24:37
know I'm open to the possibility that
24:40
this exists and I'm open to the
24:42
possibility that we can prove this and
24:44
I'd love to see it happen so far yeah it
24:50
appears to me as far as I can tell that
24:53
whatever makes life happen or whatever
24:55
makes information happen is akin to some
24:59
other law of physics that we've never
25:01
understood and Lee and Sara's paper
25:05
talks about that
25:08
you know Paul Davies and Sara done all
25:10
kinds of work around that issue and
25:13
Dennis contributed to a book called from
25:15
matter to life where they explore that
25:18
question and so like I'm open to the
25:22
possibility that we can figure this out
25:25
and we like I think as far as I can tell
25:29
if you figure this out then this is like
25:31
you're the next Nikola Tesla or Albert
25:35
Einstein and this is the next equals
25:37
mc-squared
25:39
because it seems to me that yes I mean
25:42
fairly different than what we currently
25:43
understand I mean yeah quite apart from
25:46
the evolution 2.0 prize that I think the
25:48
person who cracks this is open for a
25:49
Nobel Prize you know there's this is big
25:51

stuff we're going to come back in just a
25:54
short moment to you Dennis because I
25:55
want to get your thoughts on this as
25:56
well we're just going to our first break
25:57
and we're here asking can chemistry
26:00
crack the mystery of the origin of life
26:02
so so delighted to be joined by three
26:04
people who really know what they're
26:05
talking about someone who really doesn't
26:07
on the show today but I hope you're
26:09
enjoying our conversation and we'll
26:11
continue in a short moments time for
26:13
more conversations between Christians
26:15
and skeptics subscribe to the
26:16
unbelievable podcast and for more
26:18
updates and bonus content sign up to the
26:21
unbelievable newsletter welcome back to
26:24
today's show I love it when I get to sit
26:27
down with people who are just experts in
26:29
their field and my job is to kind of try
26:32
and bring it down to the level of the
26:34
ordinary layperson and I hope we're
26:35
doing that for you on the show today as
26:37
we talk about the origin of life how on
26:39
earth did life begin
26:40
that's quite literally the question
26:42
because at some point life's
26:43
on earth but we're still trying to work
26:46

out what happened because it presents a
26:48
lot of problems a lot of people have
26:49
said the probabilities are just so
26:51
astronomical it's very hard to see some
26:54
kind of naturalistic explanation but Lee
26:56
Cronin who joins me on the program today
26:57
says no understand the chemistry that's
27:00
the key and he's doing the experiments
27:02
which he says are gonna win the
27:04
evolution 2.0 10 million-dollar prize
27:06
that Perry Marshall and Dennis now
27:08
people have come in to talk about today
27:10
Dennis you've obviously been working on
27:14
this yourself on the sidelines to some
27:16
extent what's going on we've heard lots
27:19
of different words here teleology which
27:21
essentially means a sort of purposive
27:23
press agency which which means a mailing
27:27
same same sort of idea information and
27:31
of course all the chemical processes as
27:34
well so can you frame this in a way that
27:37
this app apps helpful for the listeners
27:38
as to what you think is at the center of
27:41
this this this enigma that is the origin
27:44
of life well I think I'm going to do
27:46
that by first using the title of your
27:48
program which I believe is under the
27:50
leaves correct now I'm gonna make a very
27:52

unbelievable cell account at least I
27:55
think it would be unbelievable both to
27:58
near Darwinists and to most of your
28:00
listeners and that is the very existence
28:03
of DNA requires teleology first okay now
28:09
that may seem very strange because many
28:12
of those who believe the idea that DNA
28:15
is the center of life it's what directs
28:18
the whole process producing the organism
28:21
which is I'm afraid aren't true it's
28:23
actually a complete cell that is the
28:25
beginning of life but let's leave that
28:27
to one side for a moment what I mean by
28:29
DNA requires teleology first it's an
28:33
incredible process the way in which
28:36
cells handle our DNA when the DNA is
28:40
copied to be contributing to two cells
28:44
in the cell dividing which is an
28:46
essential part of the development of the
28:48
organism then what you find is that the
28:52
natural error rate in that copying is
28:56
very high it's one in 10,000 of those
29:01
ping-pong balls right that very simple
29:10
anyway and it's one of those ping-pong
29:12
balls these days and but matching 10,000
29:15
of them and you get an error light right
29:16
seem very rare but these are a million
29:20
ping pong balls out a lot of errors that
29:24

is over a hundred thousand errors no
29:26
organism will be able to survive out
29:28
what does he do the cell comes along and
29:31
it corrects those errors and from one in
29:34
10,000 you get one in 10 billion Wow
29:39
which is quite a low race extremely good
29:42
because most genomes are therefore
29:44
copied completely faithfully now why do
29:47
I say that requires teleology first the
29:49
cell is a teleological structure it
29:51
knows and I use that word advisedly it
29:55
knows how to copy itself that's what Lee
29:58
is trying to do in creating the chemical
30:00
cutter he's taking her back a step to
30:02
the inorganic indeed so and I respect
30:04
that and I like that but I'm just
30:06
establishing first that it cannot be the
30:09
case that DNA as we know it today was
30:12
there at the beginning first of all it's
30:14
inert it needs activating by the rest of
30:17
the system to do anything at all yeah
30:20
second it has this terrible error rate
30:23
which how cells correct although you
30:26
need the cell for the DNA to be
30:28
absolutely so that's why I say the DNA
30:30
requires teleology first and and in that
30:33
sense if teleology is there to start
30:36
with it's almost like now as you say the
30:39

near darkness will say you're putting
30:40
the cart before that exactly so they do
30:42
because you're introducing something
30:44
that seems a little bit mystical almost
30:46
at the outset well I don't think chili
30:48
ology is mystical okay you say that
30:52
you're shaking your head at that lately
30:54
so so I mean actually I don't thinks
30:57
that Dennis's statement is unbelievable
30:59
at all in fact it's entirely amenable to
31:01
what we're trying to do in the lab aha
31:03
the thing is this is where the oh and I
31:05
think I really share Perry's frustration
31:07
looking at the origin of life reading
31:08
those books
31:09
want to try and make a soup that
31:11
magically comes up with DNA RNA or
31:14
assembled proteins it isn't gonna have
31:16
them happen because there's an internet
31:17
into information catastrophic to a paper
31:22
that I've written that talks about a
31:23
fresh hold where we're looking for
31:24
living systems mm-hmm what that papers
31:26
allowing us to do is make a life
31:28
emergence detector which I'll basically
31:31
I've made a detection system that allows
31:33
me to Spock flight when I haven't
31:35
invited have invented a flying plane the
31:38

Wright brothers only went a few hundred
31:39
yards in a wooden thing with some
31:42
bicycle pedals right yeah you're not
31:44
going across the ocean in that and so
31:45
what I'm trying to find out is the
31:48
lineage of chemistry that makes the most
31:51
primitive rubbish
31:54
machine that isn't the machine that's a
31:57
random ensemble hmm
31:58
but it's certain students at random mess
32:00
is able to copy itself and we've
32:02
actually got one of just publishing it
32:04
right now salt that makes itself a
32:07
actual table salt and that can
32:09
self-replicate from nothing now if you
32:12
think about that for saying an awning
32:13
can self-replicate but it's child
32:15
children are just ever so slightly more
32:18
complicated than the parents but not so
32:21
complicated they're impossible to get
32:22
and that if you carry on making that
32:25
that those that those templates if you
32:27
like you start to get towards a
32:29
sophistication of DNA without requiring
32:32
too so what's happening there because
32:35
because inevitably we kind of tend to
32:36
anthropomorphize this salt as though
32:39
it's oh the salt wants to do this and
32:41

it's good exactly and that's unhelpful
32:43
so we need to look and so what I'm
32:45
trying to get is an emergence of around
32:46
Norfolk behavior yeah in a completely
32:49
different way and that's kind of it
32:51
that's nice cuz almost like metaphysics
32:53
squared so what is like the metaphysics
32:55
of metaphysics right order or the
32:57
politics of the politics of the be one
32:59
yeah so what I mean what I mean is that
33:01
dear it's a Dennis and Perry are both
33:04
right that DNA is a ludicrous molecule
33:06
to expect a spontaneously form that
33:08
doesn't that's not actually good
33:10
evidence for a creator
33:12
it's evidence for other primitive life
33:15
living systems that no longer exist on
33:17
earth hasn't like in the lineage of
33:20
computers I've been designing computers
33:22
all my life
33:23
but if you look if I was to obliterate
33:24
all the computers on earth right now
33:26
we'd have a problem because we need a
33:28
computer to build a computer hmm so I
33:30
would ask what is the simplest computer
33:32
I can use to be able to slightly more
33:34
sophisticated computer to buy it build a
33:36
more sophisticated so I could make
33:38

silicon chips again right and I'd get
33:40
all the way back and that is exactly
33:41
what we need to look at DNA which is
33:43
what is the simplest machine that makes
33:45
another machine makes another mission so
33:49
again my stupid question at the base of
33:51
all this is is when when this simple
33:55
salt molecule effectively reproduces and
33:59
and some of these children become
34:00
slightly more complex or molecules and
34:02
then they the complexity kind of builds
34:04
and builds what why what what what's the
34:08
benefit of that happen so that's it so
34:11
this is where the new physics comes in
34:12
right we don't know the problem with if
34:14
you go back to the Big Bang and I write
34:16
down the equations of physics you'd say
34:18
you know how the universe would unfold
34:22
mmm none of those equations would
34:24
predict life hmm and that's really
34:26
infuriating probably to Perry to Dennis
34:28
and myself and so what we've found is
34:31
that that there is there is a missing
34:33
phenomena which I'm caught we shall call
34:35
assembly haha and what happens is the
34:37
universe likes to assemble things now
34:40
you can see that on Jupiter's spot right
34:42
you can see that in hurricanes so what
34:44

the soul is doing is it happens to find
34:46
a motif that is that fights against
34:48
error because when this when the wind
34:52
blows the set the sand away because it's
34:54
resistant to being blown away can make
34:56
itself so you can still exist all life
34:59
is it's pretty boring actually when you
35:01
think about life is a complex chemical
35:04
system that can persist over time and if
35:06
you erase it is no longer there yeah
35:09
there so so what I'm saying is that salt
35:12
that can make itself can recruit other
35:13
salt molecules or salt ions to assemble
35:18
and they are now resistant to being a
35:21
ray but you see I kind of understand
35:24
that argument on the evolute the
35:25
biological evolutionary side because
35:27
there's a sort of sense in which that
35:29
that there's there's a will almost in
35:31
even the simplest organisms to reproduce
35:34
but no no
35:36
no I mean it's the same phenomena right
35:39
there's a missing physics of information
35:41
which connects physics and chemistry and
35:44
we try and understand the heat death of
35:46
the universe and that's a really
35:47
interesting problem to try and join
35:49
together as a lot for us but life is not
35:53

special okay just a manifestation of
35:56
chemistry I mean you know here I'm kind
35:58
of the map not all matter is equal right
36:00
if you could I'm holding a bottle of
36:01
water I own that bottle of water I could
36:03
destroy the bottle and you drink the
36:04
water this matters inanimate I'm sorry
36:07
yeah
36:08
yeah it doesn't really matter it doesn't
36:09
matter and so what we're trying to ask
36:11
is what makes matter matter yes and
36:15
that's that informational imprint it's
36:17
theme okay Perry what do you want to say
36:19
to all of this there's lots I'm sure
36:20
you'd like to respond to so I think the
36:24
the key thing that he said was there's a
36:27
missing physics of information and I am
36:32
very enthusiastic about somebody who can
36:37
solve this and I think this is great I
36:40
have to admit to being a little
36:41
skeptical that Lee has solved it totally
36:45
open that maybe he did I again think
36:50
this is akin to like discovering a new
36:52
law of physics
36:53
I think this assembly that he's talking
36:56
about feel like he's right on track and
36:59
I have to commend Lee for bridging the
37:02
information and the chemistry worlds
37:05

together because so at the origin of
37:07
life meeting in Santa Fe Institute it's
37:09
do Kaufman's house there's like four or
37:11
five chemists and three or four
37:13
physicists and some biologists and the
37:16
chemists had a very different view of
37:19
everything than most of the other people
37:21
in the room and it was actually kind of
37:23
difficult for different parts of the
37:27
room to talk to each other because they
37:30
were approaching it so differently so
37:32
the fact that you're doing an
37:34
interdisciplinary bridge between these
37:36
two fields I think is great and I'm not
37:39
in a position to comment on how
37:41
successful you've been so far but I like
37:43
the work that I've seen okay so you say
37:46
you're this your you're hopeful that
37:48
this might be a new way into the issue
37:50
and and could bear some fruit I mean for
37:53
you what are the sticking points where
37:55
you can can you see it potentially
37:57
coming unstuck and maybe you know Lee
37:58
can respond to that I mean you've always
38:01
been ever since I've known you Perry and
38:03
I know your views have changed over that
38:04
time but you've always been about the
38:06
information and about the fact that you
38:08

kind of have to have information right
38:10
at the beginning to be able to have
38:11
something that kind of makes sense from
38:14
from that point on you don't kind of
38:16
yeah and there's no free lunch you can't
38:18
get information just spontaneously
38:21
appear in in that kind of way so talk
38:24
talk to me about that issue and how it
38:27
pertains to this problem and whether Lee
38:29
has a chance of of kind of solving that
38:31
that issue for me very well so
38:34
information is abstract and symbolic so
38:39
though the words in a book are formed
38:44
from paper and ink but they are not ink
38:47
and in DNA then the genetic code GGG is
38:52
instructions to make glycine it's not
38:54
glycine and and there's a symbolic
38:59
relationship and nobody knows how to get
39:03
from chemistry to symbolic relationships
39:07
now if fleas got that like men like
39:11
you're gonna you're gonna get a lot more
39:13
recognition than just getting ten
39:15
million dollars and it's really
39:17
extraordinary I have some caution that
39:21
you're making it sound too easy but you
39:23
know I don't know what you accomplished
39:25
in the last few weeks so I remain
39:28
willing to be convinced okay whatever
39:30

that salt is it's not going on any fish
39:33
and chips any time soon I suspect
39:38
Maynooth at you you're very concerned
39:41
about Dennis is as we search the Stars
39:44
and the planets for the possibility that
39:46
life might exist elsewhere we obviously
39:49
need to be very careful we don't
39:50
cross-contaminate
39:51
with what's already happened I might
39:54
disagree but okay I mean what would it
39:57
mean for you Dennis if we did find even
40:00
the most simple life or the building
40:02
blocks of life let's say
40:03
elsewhere well first of all that there
40:06
are a lot of very important questions
40:10
that are not yet clear first of all the
40:13
code itself between the sequence of DNA
40:16
and sequence of proteins we know as
40:20
Paris already referred to that
40:22
particular triplets code for particular
40:25
amino acids now an important fact about
40:28
that code is is redundant there are far
40:31
fewer amino acids than there could be
40:33
from that code alone is only about 20
40:38
and you could easily have 32 now that
40:41
means that each of those triplets code
40:43
so I've written up the other way around
40:45
each of the amino acids can be coded for
40:48

by more than one triplet that's the
40:51
redundancy now does that really have to
40:53
be there could there be proteins with
40:56
more than 20 amino acids I can't see why
40:59
not and if we find life on wherever in
41:03
the solar system that's the most likely
41:05
place we might find it in addition to
41:07
earth does it have if it has a code at
41:10
all does it have just the 20 amino acids
41:14
that we know of or does it in fact have
41:17
no DNA at all as I think we're
41:20
postulated writers discussion but it's
41:22
extremely likely that if there are very
41:24
primitive forms of life there won't be
41:26
DNA at all I would like to know the
41:28
answer to that question yes so if if we
41:31
do it won't necessarily look like life
41:33
on Earth necessarily that's right and
41:36
you're nodding your head in agreement
41:37
with that Lee so yeah yeah well I just
41:40
tell you so the the assembly thing that
41:41
put the paper that perry was talking
41:43
about is reef amir an important concept
41:46
and i want to take two seconds if I may
41:49
to tell you about why we need it um so
41:51
the Large Hadron Collider is arguing one
41:53
being one of the most successful
41:54
experiments done not just because of the
41:57

grin the grandness of the science but
41:59
the way it's been communicated so you've
42:01
got this thing called the standard model
42:02
of the universe which we believe is
42:03
correct always say we've got evidence is
42:06
correct there's actually some wrinkles
42:07
in it but let's just accept that that's
42:08
pretty okay okay and that standard model
42:11
says we have two for gravity exist needs
42:13
to be a particle and that particle was
42:16
called the Higgs
42:17
then they took the standard model and
42:18
they then worked that up and did a
42:20
simulation if you like and they worked
42:22
out more energy to find it yeah so then
42:25
they disinvite an experiment so no the
42:27
standard model there no looking at the
42:28
hexagon experiment and all they did is
42:30
they looked at that energy range
42:31
smashing particles together and they
42:33
looked for the Higgs and hey presto and
42:35
they found it so we're gonna go look for
42:38
life guys what are we gonna find and
42:40
then you know Perry will say we want
42:42
this and Dennis will say I want that and
42:44
Lee will say I want and we like say why
42:46
okay dammit we can't actually decide on
42:49
what life is so what I've come up with
42:53

isn't is a is treating look so it's
42:56
forgetting what life is but looking on
42:58
what life does okay so what does life do
43:00
that's different to a nonliving say
43:03
planet life makes things now it makes
43:06
really simple things so it could make
43:08
carbon dioxide and carbon dioxide from
43:10
biology and carbon dioxide from
43:12
inorganic stuff looks the same but
43:14
actually you do something more important
43:16
you make complex molecules you make cars
43:19
you make silicon processes mmm so if we
43:23
look for objects that basically can't
43:26
randomly form like neat like have a
43:29
Creator and I don't like using the word
43:31
creator because then we get into this
43:32
discussion about intelligent design but
43:35
I think actually I shouldn't be shy
43:38
about having that discussion because I
43:39
think before the end of it yeah many of
43:41
your listeners will say well hang on I
43:43
mean I have a belief system I want to
43:45
understand why you kind of why don't
43:48
include that why you don't have that
43:49
discussion exactly okay so but but life
43:51
living systems tend to make stuff be
43:53
another living systems more artwork take
43:56
it Jackson Pollock you know a Jackson
43:59

Pollock when you see one so if you've
44:00
but the thing is if you go to Mars and
44:02
found the Jackson Pollock you'll say
44:03
that's a random assemble now you say you
44:06
find three or four objects that look
44:09
really complicated but the khalidi had
44:10
the same artist you'd know that Jackson
44:13
Pollock had been to Mars for sure and so
44:16
that's what pathway assembly starts to
44:17
do it gives you a metric mm-hm says
44:20
there's this thing called life we don't
44:21
have a general theory for but we know
44:22
there is this thing it does and now we
44:25
have a way of going looking for it and
44:26
that's what we've been doing in my group
44:29
and and so
44:30
if if they did go to Mars and find you
44:33
know some something that was approximate
44:36
to that basically your theory will be
44:39
confirmed it's like the Higgs boson kind
44:40
of confirmed that but I would say if you
44:42
went to Mars and let's put it and you
44:43
found a thousand iPhones right and they
44:46
all turned on yeah and they all worked
44:49
you could only conclude that Apple had
44:51
started making iPhones on Mars which
44:53
which would be completely belief or
44:55
shipping or shipping them there you
44:57

wouldn't go all that did these iPhones
44:59
just randomly assembled on Mars no sure
45:02
so that I think that's what I'm saying
45:04
okay all right let's come back to you
45:09
Dennis the you you say that actually
45:11
you're really interested in in the
45:13
search for extraterrestrial life in that
45:15
way yes because I think it answers some
45:17
of the big questions of biology today
45:19
yes now if if we went out and say in our
45:24
solar system and in aliens we might have
45:25
access to just couldn't find any sign of
45:28
anything approaching you know would
45:30
would that be strongly this
45:31
conformational of these approach do you
45:34
think or not necessarily we are an
45:36
extremely tiny part of the universe of
45:40
course even the whole solar system
45:41
though it's vast in terms of the size of
45:46
an organism like you and me it's still a
45:50
very very tiny bit of the whole universe
45:53
now there is a theory that some forms of
46:00
life can go completely dry and survive
46:05
in space okay this is called the
46:07
panspermia idea now I think this is
46:11
close as science gets to being
46:14
unbelievable now but it is a theory
46:19
theory it's been seriously held it was
46:21

just formulated as far as I know by Fred
46:25
Hoyle the astronomer many many years ago
46:28
and one of those who thought a lot about
46:31
the and this would be potentially some
46:35
people to put this as an explanation for
46:36
how life was seeded on earth that it
46:38
came from somewhere else that's the idea
46:40
yes infirmed and there is evidence you
46:42
see thought that because some of the
46:43
meteorite
46:44
have come down onto earth from somewhere
46:47
up there we don't know wave long contain
46:51
organic comic chemicals and they can
46:54
contain up to 70 different amino acids
46:57
that's 50 more than we've got I've got a
47:00
feeling this was the premise of that
47:01
Ridley Scott knew he wasn't it where the
47:03
architects come in birth birth life or
47:05
something early on but again let me just
47:08
answer that so we've we've turned this
47:10
the same pathway assembly idea into a
47:12
life detection system right that we're
47:14
making for NASA we've also taken all the
47:17
meteorites and analyzed them using this
47:19
detection system and yes you can make
47:21
lots of amino acids but they're all able
47:23
to be made in a random shuffle of the
47:25
card deck they're all random molecules
47:28

so although you can find them Ino acids
47:30
on meteorites
47:31
they've just been cooked up in space
47:32
they have never touched life they've
47:34
never been anywhere near life they are
47:36
not life but they might be used by life
47:38
bacteria could eat meat right no problem
47:41
so you don't think panspermia thing is a
47:43
going well no I I'm so I agree with
47:46
Dennis that this is almost as
47:47
unbelievable as they come but I haven't
47:49
seen any and I've certainly seen no
47:51
evidence for panspermia however I won't
47:53
just shoot it down because it's
47:55
improbable or impossible because I don't
47:57
like the idea I think it's far easier to
48:00
make life on Earth and then transport
48:03
life from elsewhere in the in the
48:04
universe and put it here right I think
48:07
that life might have got going on Mars
48:09
mm-hmm a little bit of the chemists
48:11
research okay and then it kicked out the
48:13
chemistry right because Earth has got a
48:16
bigger gravitational pull life mark life
48:19
was in the hat' masses and the habitable
48:20
zone earlier we got cooking okay did the
48:23
precooked it the pre-course for you okay
48:25
and chucked it on earth where it made
48:27

the main menu okay that's that's an
48:29
interesting theory maybe and what what
48:31
do you reckon about that Perry do you
48:34
think I mean do you do you feel in any
48:37
way like there's a chance we could find
48:39
life elsewhere and what would that have
48:40
to say to to your search for the origin
48:43
of life yourself Perry I don't have a
48:47
strong opinion about I'm probably
48:51
roughly similar to Dennis on this and
48:53
Lee hey if if this happens to be the
48:57
case
48:58
well that's very very interesting on the
49:02
other hand you know there's there's a
49:03
but probably 15 or 20 years old called
49:06
where is everybody
49:09
and it's a book about well where all
49:12
these aliens that should be so
49:14
abundantly likely to occur
49:17
hmm so I I don't I don't have a role
49:20
straw I mean I had probably gang um for
49:22
ten years ago now Paul Davies on my show
49:24
which and it was around the particular
49:26
anniversary of the search for
49:27
extraterrestrial intelligence and he'd
49:29
written a book called the eerie silence
49:31
and I remember him saying effectively
49:32
well life fizzing he said life is at one
49:36

level incredibly improbable such that
49:38
either it's only probably developed once
49:40
here on earth or there's some other
49:42
principle at work whereby if it can and
49:45
arise it will arise which kind of sounds
49:47
like your your principle at some level
49:49
they but but he was also very critical
49:52
of the typical sort of happy chance
49:55
coincidence kind of theories he said
49:57
that that's just not really a viable
49:58
option so um we're going to go to a
50:03
break just shortly but um here's a name
50:06
and I don't know if any of you have come
50:08
across this probably Perry you might
50:09
want to speak to this someone who people
50:11
keep saying I should get on my show to
50:13
talk about this issue is gym tour James
50:15
tour who I believe is a u.s. professor
50:17
of nanotechnology and and from what if
50:19
Ellie Lee has put his head in his hands
50:21
which I guess suggests with the way he
50:24
feels about this name I died I'm coming
50:26
to this as a lay person but I've I've
50:28
heard people saying Jim tour he's your
50:29
man because he says he knows his stuff
50:32
and he says it just isn't going to
50:34
happen in a naturalistic fashion there
50:36
has to be some kind of design going on
50:38

an input of information right at the
50:40
beginning all right before we get to Lee
50:42
who looks very who has had an
50:47
interesting reaction to that name Perry
50:49
what's your what's your position on on
50:51
Jim tour and and what he's saying in
50:53
this debate well I admire anybody in
50:58
academia who's willing to go against the
51:02
grain and call a spade a spade and say
51:05
what he really thinks because frankly I
51:07
think most scientists are afraid to do
51:09
so he's a
51:11
chemist I'm an information guy he and I
51:14
have had brief conversations we kind of
51:18
speak different languages so you know
51:20
all all it the chemists Duke it out
51:24
about chemistry but what I would say is
51:27
that a lot of origin of life people make
51:30
it sound as though well you know all we
51:33
need to do is get a little replicator
51:35
started and it's all gonna go from there
51:38
and most of the time they're being
51:40
dishonest even about the word replicator
51:43
well if you're want to replicate the way
51:46
a cell does you have to have symbolic
51:49
code that stores information about how
51:56
the organism is supposed to be put
51:58
together and that's completely different
51:59

than RNA strands making copies of each
52:02
other which is kind of like um like
52:05
crystals forming and so I gotta say
52:09
there's a lot of dishonesty in the
52:12
origin of life field and James tour is
52:16
saying what he thinks and I at least
52:18
salute him for doing that and I'd be
52:21
interested in hear what we have to say
52:24
about civics in fact maybe you Liam
52:27
James could have a debate on this show
52:29
maybe they could maybe they could but I
52:31
I we're gonna go to a break for now and
52:33
then we'll hear what he has to say about
52:35
James tour and we will come back shortly
52:38
talking about the origin of life the
52:41
mystery of the origin of life and
52:42
whether chemistry can crack Italy Cronin
52:44
Denis Noble and Perry Marshall and I
52:46
guess on this week's edition of
52:47
unbelievable
52:48
if you listen to unbelievable Justin
52:50
brierley on the premiere Christian radio
52:52
and enjoy the conversations between
52:54
Christians and skeptics then this is the
52:56
perfect app for you
52:57
for the latest updates podcasts videos
53:00
articles bonus content and much more
53:03
download premier unbeliever app today
53:07

[Music]
53:10
it's been such an interesting discussion
53:12
today can chemistry crack the mystery of
53:14
the origin of life my guests Lee Cronin
53:16
Dennis Noble and Perry Marshall have
53:18
been with me
53:19
Lee before we continue the conversation
53:22
where can people go and find out more
53:24
about your fascinating work just go to
53:26
Cronin lab comm Cronin lab comm just one
53:30
word and there's all the papers and news
53:33
there and way to contact me fantastic I
53:36
managed to watch a little sort of mini
53:38
documentary I think it's a couple of
53:39
years old about you and your family and
53:41
your search for the origin of life what
53:44
one bit that amused me was you were all
53:47
sat around the dinner table or doing
53:48
some activity with your little kids I've
53:50
probably been told it out but um and you
53:53
asked one of them where where did humans
53:54
come from one of them said God and then
53:56
the other I think younger one piped up
53:58
now don't be silly God doesn't exist I
54:01
thought I wonder I wonder where that's
54:04
come from but I read this this takes us
54:07
neatly to the the question of design the
54:10
design hypothesis you know you've said
54:12

well look we need to look at it at least
54:13
we can't dismiss it out of hand
54:15
necessarily sure and it sounds like
54:18
people like James Tour who as I say
54:20
isn't here to defend himself but as far
54:23
as understand that he kind of fits with
54:25
a kind of intelligent design view that
54:27
actually there's you cannot get a
54:29
naturalistic explanation that does
54:31
justice to the origin of life there's
54:33
too much improbability too much
54:35
complexity you've got to have a kind of
54:37
input of information right at the
54:39
beginning whatwhat what's your overall
54:42
reaction to him and to those kinds of
54:44
theories I'll give you one word nonsense
54:47
but let me just unpack it so James is a
54:49
really accomplished chemist he's a great
54:51
designer so he loves designing molecules
54:53
and he's good at it where I think James
54:56
has a problem and where I think let's
54:59
let's take it at face value that's just
55:00
that's just this make this at there's
55:03
three possible things that James is
55:04
trying to number one he's just trying to
55:06
provoke people just to see how they
55:08
react which is fair enough
55:09
which he may wish I guess he's probably
55:11

doing but he clears clearly doesn't
55:15
understand information all the
55:16
mathematics because the statements he
55:18
make a contradict makes a contradictory
55:20
about complexity and how things emerge
55:22
but I think Perry is right about the
55:25
origin of life kind of the way it's
55:26
pitched but I wouldn't say origin of
55:28
life is a disingenuous or being
55:30
dishonest I think they are not
55:32
explaining their narrative and what was
55:35
properly and their you sorry they're
55:37
exploiting a narrative and what I find
55:40
problematical is these people then argue
55:42
against creationists to say you're
55:44
creationists that's clearly not correct
55:46
but yet the origin of life people
55:49
require so many random things to not be
55:51
random the almost a creationist for the
55:54
origin of life so I find this to
55:56
communities arguing one another and they
55:58
like and unlike guys you don't
56:00
understand information theory and the
56:02
emergence of this so what I would like
56:04
to do and like I am it's not here it
56:06
could get here to defend himself
56:08
he's a wonderful designer and of course
56:11
he's gonna say it's too complicated but
56:13

let's look at the experiments that will
56:16
demystify that and help us give us some
56:18
information to know whether it's
56:20
possible to create information and I
56:22
think that one thing I would like to
56:23
pull you and Perry up on is you
56:25
discussed it so well is impossible to
56:27
create information no it isn't that's
56:29
the point you but you're not creating
56:31
information you're creating randomness
56:33
without teleology when suddenly that
56:35
randomness is finds a use it is then
56:38
trapped and promoted and that process is
56:42
the emergence of encoding and decoding
56:44
and it's so super exciting because I
56:47
think I will be out convinced Perry and
56:48
Dennis and anyone else who cares that
56:51
we've got systems that can do that and
56:53
more importantly we can start a wider
56:56
debate to put the limits on how how much
56:58
have we cheated because isn't me having
57:00
a lab on a robot that's cheating yeah
57:02
and we're having information in that's
57:04
cheating I mean it interestingly with
57:07
you Dennis I've often felt that you have
57:10
some common cause with the intelligent
57:12
design community because both you and
57:15
the intelligent design folk that
57:16

Discovery Institute and so on I have an
57:19
enemy in the neo-darwinian kind of
57:21
explanations and I know that a number of
57:23
them turned up to kind of be you know
57:25
your Royal Society conference keeping
57:27
about 20 of new trends in evolution now
57:29
now this and obviously origins of life
57:32
all plays into this as well so what
57:34
I mean do you have any sympathies
57:36
yourself with that particular way of
57:38
getting at the issue that the design
57:40
hypothesis or do you think it's a dead
57:42
end as obviously leaders I think it's a
57:45
dead end for the following reason it
57:47
isn't actually useful mm-hmm
57:49
I don't take the view that scientific
57:53
theories are ever completely proven they
57:57
can be disproven I am a pop Irian just
58:01
to use the technical philosophical
58:03
phrase for that I think we can disprove
58:05
things we never completely prove
58:08
something in that sense there's always a
58:10
bit of mystery to science we're still
58:12
asking questions and we resolve one
58:15
question we ask get more questions now
58:18
the real function theory in science is
58:21
to be useful what experiments would you
58:24
do because you think this theory is
58:26

worth testing
58:27
that's my touchstone now the difficulty
58:30
with the intelligent design view is I
58:33
can't see how you'd ever test it right I
58:36
mean it's really saying as it were
58:38
you'll never do it and leave will never
58:40
do it now I take the view that the only
58:45
way to make an advance is to try to do
58:47
it now I also think that it's true to
58:53
say that what life does is not just to
58:56
exist you used a phrase earlier on the
58:58
rich was it's what life does that is
59:02
important and I think that's got the
59:04
point is the process now the something
59:07
we know about processes I don't know
59:09
exactly how these self-replicating salt
59:12
works but I suspect there's a bit of a
59:14
whirlwind there in some way or another
59:17
that contains the information that keeps
59:20
the thing going we see that with weather
59:22
formations already and that's what the
59:24
the spot on wherever it is Jupiter or
59:26
wherever also tells us there are things
59:30
that do naturally arise and once they
59:33
arise and this is the key to them they
59:35
then harness the molecules that are in
59:38
them to continue that process but in a
59:41
sense it's it's still charms that gets
59:43

to that point but it's not it's not
59:46
these vast in probabilities your
59:48
some people painters because you're
59:50
saying that once you get something that
59:53
works it's gonna kind of grab on to
59:56
other things that it's about trapping
59:58
chance and what we what what what
60:00
happens in the molecular level is
60:02
basically lots of things can happen and
60:04
so you've just got lots of possibilities
60:06
and molecules lots of different states
60:08
and what happens when though that trance
60:10
gets trapped that then that acts as what
60:13
we call a template like a template for
60:15
an archway and that can make a really
60:17
small archway and that can you can get
60:19
there randomly but suddenly have an
60:21
ordered structure all you need is stuff
60:23
in energy now you've got that archway
60:25
and stuff and energy can make another
60:28
bigger archway makes a template of a
60:29
template for template and before you
60:31
know it you've got a complex
60:33
self-replicating system that has emerged
60:36
from no information and that's what
60:38
we've just proven and it's been
60:40
published right now you can get the
60:41
archive file and it is the first-ever
60:44

spontaneously arising I'm gonna use a
60:46
technical word now called an
60:48
autocatalytic set first predicted by
60:51
Freeman Dyson and Stewart Kaufman so
60:55
they're both very excited that this
60:56
occurs because the probable candidate
60:58
sets today now the I'll tell you about
61:00
that will quickly feel for your for your
61:02
listeners an autocatalytic set is a bit
61:05
like a mutual carpenter so let's just
61:08
say you're gonna go and buy tables and
61:10
chairs and you can't buy a table and
61:12
chair separately and what happened is
61:14
that in this case the table makes the
61:16
chair and the chair makes the table
61:19
together they make each other they don't
61:21
make each other independently there's a
61:22
little bit of assembly and these are
61:25
thought to be the first systems all
61:27
leave to be Lou to evolution we've only
61:29
ever seen them in very complicated
61:31
pieces of nucleic acid DNA RNA or very
61:36
complicated proteins and these are way
61:38
above the information fresh hold so once
61:40
again you have to be okay have to have
61:42
all that information no one has ever
61:43
shown the emergence of replicators
61:46
coupled from randomness and what we've
61:49

done is we've uses to generate an
61:50
entirely new nanotechnology so suddenly
61:52
we can make molecules really small
61:54
molecules into a nanotechnology using
61:56
this salt and understand how exists to
61:59
harness it for other devices
62:02
Perrie where you're a Christian you're
62:05
the only Christian among the three
62:07
guests have got on the show today
62:09
where does this leave you and the God
62:11
question I mean was it always kind of
62:13
where you were always going to be happy
62:14
if a naturalistic explanation you know
62:17
was posited do you feel this has any
62:20
implications for the I can't I guess
62:23
uniqueness of life if if we may be
62:25
correct well the signature moment in my
62:31
journey was discovering Barbara
62:35
McClintock and finding out that a corn
62:37
plant could edit its own DNA and finding
62:40
out that bacteria could chop their DNA
62:43
into a hundred thousand pieces and
62:44
rearrange them and I suddenly realized
62:47
that the whole intelligent design
62:50
argument the way it's traditionally made
62:52
is focusing on the wrong thing because
62:58
you're gonna they're saying well you
63:01
know their God is out there and God did
63:03

this thing and as an engineer I
63:05
completely understand that argument but
63:07
then when I found out that well a cell
63:10
at its own DNA it's sort of like an MC
63:14
Escher drawing where a hand is drawing a
63:18
hand then it's a whole new ballgame and
63:23
to me as an engineer a universe that
63:25
works that way is way more impressive
63:27
than a universe where God has to show up
63:30
and push buttons and so I felt like the
63:34
science was being misrepresented by both
63:37
the Neo Darwinists and the intelligent
63:39
design people in fact I was kind of
63:41
astonished that the intelligent design
63:43
people weren't talking about it but they
63:46
weren't and so I just take that and I
63:49
wind it back to origin of life and I say
63:51
well what if that's the same sort of
63:53
thing you know we know that a corn plant
63:56
can edit its own DNA what if there are
63:58
laws of physics that can cause
64:00
information to emerge well that's that's
64:03
a dang impressive universe and so I
64:06
still have my sense of wonder and I
64:08
still believe in God and you still have
64:10
to explain where it all came from well
64:12
that it makes the whole system just that
64:14
much more
64:15

perhaps it does in your eyes Perry but I
64:17
suspect for you Lee you know you'll take
64:19
your Occam's razor to that system and
64:21
say well well no need for goddess it all
64:23
explains itself thank you very much well
64:25
I mean I'm not sure me discussing my
64:29
religious leanings and using that as a
64:33
way to kind of dismiss others is not
64:36
productive because I think what I think
64:39
Perry is saying quite nicely it's like
64:41
he wants to keep his sense of wonder I
64:43
have a sense of wonder in the universe
64:44
and I happen to not use religion to have
64:47
it but I mean I would maybe adopt what
64:49
Carl Sagan so you mean maybe in the end
64:51
Perry's God is the same as my god but if
64:55
my God is the physical universe and I'm
64:57
just like wow look at it unfold mm-hmm
64:59
so I do not a lots of scientists do not
65:02
don't like the argument with them to
65:06
have the argument with intelligent
65:07
design because they feel that their
65:09
words are going to me somehow
65:11
misrepresented and put back against them
65:13
and I find I find that problematical
65:15
because lots of there are lots of
65:17
religious people that have beliefs are
65:19
very smart they want to understand how
65:22

much of those beliefs can be falsified
65:24
so if the belief can't be falsified so
65:27
if something can be falsified I can
65:28
bring it into my ocular razor world in
65:30
ourway ago if I can't falsify it then I
65:33
am entitled to light believe it and just
65:35
I have a belief system there but I think
65:37
that science and religion don't touch in
65:39
that way they're mutually compatible I
65:41
don't believe that you know this is why
65:44
I get angry about the origin of life
65:46
people not correctly accounting for the
65:49
complexity of their molecules and then
65:51
dissing intelligent design right because
65:54
they're basically both making a
65:57
narrative okay which is not falsifiable
65:59
it's a really interesting way of putting
66:01
it
66:01
because it's just such a fascinating
66:03
program today thank you all for being on
66:06
where might people be able to find out
66:09
more about your work as well Dennis
66:12
where should what should people be
66:14
typing into their search bars in order
66:16
to find out more about the easy stances
66:19
just type Dennis no well that's cool but
66:22
with one end not too late there was a
66:24
two end and it's Noble it was a very
66:26

great paratus
66:28
we don't want to introduce any false
66:31
false information into our intelligent
66:34
design searches anyway look it's been
66:36
great fun and of course Perry if people
66:39
want more about evolution 2.0 and the
66:42
prize where can they go for that Evo
66:45
number two org you vote org well I'll
66:48
make sure that all three of you have the
66:50
links as well from today's show you can
66:52
find that over the web page premier
66:53
Christian radio comm forward slash
66:55
unbelievable it's been an absolutely
66:57
fascinating discussion so Lee Dennis and
66:59
Perry thank you very much for being with
67:01
me - thank you
67:01
great pressure for more conversations
67:04
between Christians and skeptics
67:06
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