

# The Bible and evolution: Opinions amongst southern African clergy and theologians from the Reformed church tradition

**Author:**Peet J. van Dyk<sup>1</sup>**Affiliation:**<sup>1</sup>Department of Biblical and Ancient Studies, University of South Africa, South Africa**Correspondence to:**

Peet van Dyk

**Email:**

vdykjp1@unisa.ac.za

**Postal address:**

PO Box 392, Unisa 0003, South Africa

**Dates:**

Received: 01 Aug. 2012

Accepted: 17 Apr. 2013

Published: 03 June 2013

**How to cite this article:**

Van Dyk, P.J., 2013, 'The Bible and evolution: Opinions amongst southern African clergy and theologians from the Reformed church tradition', *Verbum et Ecclesia* 34(1), Art. #776, 9 pages. <http://dx.doi.org/10.4102/ve.v34i1.776>

**Copyright:**

© 2013. The Authors.

Licensee: AOSIS

OpenJournals. This work is licensed under the Creative Commons Attribution License.

**Read online:**

Scan this QR code with your smart phone or mobile device to read online.

The main objectives of the present study were to determine the opinions of southern African clergy and theologians (from the Reformed church tradition) about evolution and faith and to assess their degree of knowledge regarding the biological theory of evolution. A total of 1720 structured electronic questionnaires were sent out via email to all clergy belonging to the 'Nederduitse Gereformeerde' and 'Hervormde' churches, of which 89 were received back. The SPSS 20 statistical program was used to conduct descriptive and inferential statistical analyses of these data. Most participants were positive about the theory of biological evolution, but expressed the belief that evolution should be seen as a process guided by God. However, most participants failed to appreciate the fact that this view was contrary to the non-teleological nature of the biological theory of evolution and failed to distinguish between what should be accepted in faith and what can be demonstrated or 'proved' (e.g. as is common in intelligent design circles). Many participants were not clear about the finer aspects of evolutionary theory and therefore often believed common misconceptions about it. In conclusion, one could say that participants were positive about evolution and, at least nominally, agreed with non-fundamentalist views of the Bible.

## Introduction

Since Charles Darwin ([1859] 1968:130–172) suggested natural selection as a plausible mechanism for biological evolution, his theory has been controversial. It was, for example, perceived as a major threat to faith and the authority of the Bible by the then Anglican bishop of Oxford, Samuel Wilberforce (University of Cambridge 2012:n.p.). Current anti-evolution sentiments are most often expressed by fundamentalist religious groups such as the creationist and the intelligent design groups – especially in the USA (Miller, Scott & Okamoto 2006:765–766; Moran 2011:n.p.; Hill 2012:n.p.).

According to one of the best known American polling organisations (i.e. Gallup), 40% of Americans believe that God created humans less than 10 000 years ago ('creationist view'), whilst 38% believe in a God-guided process of evolution ('theistic evolution') and 16% thought that it was a process of development without God's involvement ('secular evolution') (Newport 2010:n.p.). The Gallup opinion poll has been running on a regular base since 1982, with little variations in its results: the theistic view has remained almost constant during the years, although the 2010 poll showed the first slight decline in the creationist view, with a concurrent slight *increase* in the secular view (Newport 2010:n.p.).

Radical creationist views have nonetheless remained problematic to many Christian theologians and clergy and are by no means limited to the USA, but are also prevalent in other regions of the world (cf. Dawkins 2009:4, 431). In southern Africa, such creationist tendencies are *inter alia* evident from the regularity with which southern African theologians and clergy are confronted by questions from ordinary or lay people regarding the age of the earth and biological evolution. What is even more disconcerting is the fact that such enquirers often assume that theologians and clergy, as a matter of course, would agree with the radical views of prominent American creationists (personal observations).

The limited objectives of this study were:

- To determine the opinions about evolution of clergy and theologians within the Reformed church tradition and to determine how they related faith and the biblical record of creation to the scientific theory of evolution.
- To assess the level of knowledge regarding biological evolution amongst clergy and theologians.

The reason for the survey was to facilitate a more informed debate about evolution within the church in southern Africa and to inform the future education of theological students at universities and seminaries in southern Africa with regard to this topical issue.

### Possible opinions about evolution and faith

It has already been argued by Dawkins (2009:429) that the question about the secular view of evolution in the Gallup poll is problematic, because it may deliberately 'bias religious people against it'. The main criticism which may be directed against the question in the Gallup survey is that it does not clarify if God's supposed involvement in evolution is flatly denied or if such involvement is viewed as a possibility, but that this involvement cannot be clearly demonstrated or 'proven' by ordinary scientific methods and could therefore only be accepted in faith (cf. Van Dyk 2001:157–164). We would therefore like to argue that it may be more appropriate to at least distinguish five possible viewpoints regarding biological evolution.

The first viewpoint can be called 'young earth creationism', which denies all possible forms of biological evolution and believes the earth is, in accordance with the literal interpretation of the Bible, not more than 10 000 years old. This is a form of *extreme fundamentalism* and regards the Bible as an authoritative handbook of science.

The second viewpoint is that of 'old earth creationism'. According to this opinion, God either recently created the earth, but on a pre-existing older earth (i.e. so-called Gap Creationism or the ruin-reconstruction theory, cf. Fairchild n.d.), or God allowed *progressive creationism* (e.g. limited genetic mutation). However, this last view does not allow for transitional evolution of one species into another (i.e. speciation), but only for limited development within the same species. It is therefore only a partial acceptance of *some* aspects of evolutionary development, whilst it rejects the major tenant of scientific evolutionary theory that speciation took place during evolution. This view regards the biblical record of creation as *largely correct*, with only a few minor reinterpretations needed to make biblical texts compatible with *some* results of science. For example, that Genesis 1:2 should be interpreted to mean that the world pre-existed before creation.

The third viewpoint is 'intelligent design'. This popular teleological view proposes that God guided the process of evolution, whilst assuming that this intelligent design (or God's hand in creation) is 'clear and could be seen by all'. Divine intelligent design could therefore be proved or at least be illustrated in a rational manner. These assumptions of intelligent design largely overlap with those of earlier Natural theology (e.g. Paley n.d.). (For a detailed criticism of the intelligent design concept see Dawkins 2006:79, 17–158; Hitchens 2007:71–96). Within this option, opinions may range from being more fundamentalist to being less fundamentalist in view, depending on how much a specific person is willing

to accept the inaccuracy of the biblical creation record. More fundamentalist persons would expect to find at least some correct 'scientific' facts about the origin and function of the cosmos in the biblical record, whilst people with less fundamentalist views would expect most, if not all, of the biblical creation record to be pre-scientific and outdated (see below). Proponents of this view are often (but not necessarily always) naive about the fact that their teleological views of nature contrast sharply from those of biologists who mostly define evolution as non-purposeful (cf. Van Dyk 1993:221–295; Williams 1966:35–53).

The fourth viewpoint is of 'evolution as a God-guided process that cannot be proven', but could only be accepted in faith. This view agrees with the intelligent design opinion above, insofar that it reckons with some form of divine guidance, but fundamentally differs from it in accepting that any guidance or purposefulness in the evolutionary process cannot be demonstrated or be proven. This opinion appreciates the fact that any such attempt to demonstrate divine design within the cosmos ultimately boils down to an attempt to prove God's existence and is often based on circular arguments (cf. Dawkins 2006:75–110; Hitchens 2007:73–96; Van Dyk 2001:157–164). It also recognises the fact that the scientific theory of evolution does not involve any teleological assumptions. The view is an extreme form of non-fundamentalism in that it reckons with the basic inaccuracy of the biblical creation record because of its outdated and pre-scientific cosmology (cf. Bultmann 1984:9; Gadamer 1989:273; Gay 1966:34; Van Dyk 2009:5–6). It thereby fully appreciates the implications of not regarding the Bible as a science handbook and would regard any possible agreement between the biblical record versus the physical origin and function of the cosmos as proposed by contemporary science as extremely unlikely or as purely coincidental.

The fifth and final viewpoint is then one of 'atheistic evolution', in which evolution is seen as an entirely natural and physical process, without the involvement of any supernatural force. This is a completely secular view of biological evolution, but may partially overlap with the fourth view above, depending on whether its adherents merely temporarily suspend their belief in God, whilst dealing with science (temporary atheism), or whether they are indeed radical atheists.

In essence, the first and second viewpoints are forms of *creationism*, whilst the third and fourth viewpoints could be termed *theistic evolution*, although some forms of the fourth viewpoint may lean more towards the *secular* view expressed by the fifth viewpoint, by temporarily assuming atheistic assumptions whilst practicing science. In discussing the results of the survey on evolution and the Bible, the above five viewpoints will be considered when evaluating the replies to each question.

### Research method and design

An empirical survey was conducted amongst southern African clergy and theologians. The survey formed part of a

larger study regarding faith, science and biological evolution and how the relationship between faith and science is perceived.

## Sample

Electronic questionnaires were sent via email to 1720 southern African clergy and theologians (i.e. in South Africa, Namibia and Zimbabwe). The choice of participants was determined by both the objective of the study (to assess opinions amongst clergy and theologians in the Reformed church tradition) and the availability of email addresses to the researcher.

Questionnaires were sent to all clergy (with email addresses) in the 'Nederduitse Gereformeerde' and 'Hervormde' churches (email addresses of clergy from the 'Gereformeerde' and other Reformed churches were not readily available on the Internet). Questionnaires were also sent to all theologians at the University of Pretoria, University of Stellenbosch, University of the Free State and members of the Old Testament Society of Southern Africa.

The sample should therefore be viewed as a 'convenient sample' (cf. Coolican 2004:42), because it excluded all clergy without email addresses. Sampling attempted to avoid any bias in terms of gender, age, occupation or geographic location, but because of the nature of the population sampled, the results would reflect *mostly* the views of White Afrikaans-speaking men from the Reformed church tradition in southern Africa.

Participants were assured that their anonymity would be protected and they were requested to either send back their completed questionnaires via an anonymous email account or to ask a friend or colleague to send back the questionnaires on their behalf. This advice ensured that even where participants sent back their questionnaires from their own email accounts the researcher could not be sure from which individual a questionnaire was received.

## Measuring instrument

A structured electronic questionnaire (in MS Excel format) was used for the survey. With each question the participants had only to click on the answer of their choice. The electronic questionnaire was programmed in such a way that coding of choices was automatically transferred to a separate Excel sheet, which could then be copied error-free to SPSS version 20 (Pallant 2007) for statistical analysis.

Participants were explicitly instructed not to do any research regarding the questions, or to discuss their choices with other people, because the purpose of the survey was not to establish right or wrong answers, but to assess the clergy's and theologians' personal opinions and perceptions. The following information was obtained from the questionnaire:

- Demographical information (i.e. gender, ethnic group, age, highest theological qualification, where the qualification was obtained, church tradition, place of

residence, occupation and discipline of specialisation or main interest).

- Likert scales (ordinal five-point scales, ranging from 'strongly agree' to 'strongly disagree') were used to measure participants' opinions regarding: science and faith (14 questions) and evolution and faith (16 questions).

## Statistical analysis

As stated above, the software program SPSS version 20 was used for descriptive and inferential statistical analysis of the data. The five-point Likert items (Questions 1–30) were coded to range from +2 (strongly agree) to -2 (strongly disagree). This implied that a positive value would indicate agreement with a specific statement, whilst a zero value would reflect uncertainty and a negative value would reflect disagreement.

For the sake of easier interpretation of frequencies of choices, items were simplified by combining the 'strongly agree' with the 'agree' choices and the 'strongly disagree' with the 'disagree' choices. However, because this procedure could potentially hide possible intergroup differences (where differences may be primarily between the 'agree' and 'strongly agree' categories or between the 'strongly disagree' and 'disagree' categories) a *level of agreement* or *level of disagreement* was also calculated. This was accomplished by first calculating the mean for each scale and then classifying this mean in terms of the following levels of agreement or disagreement:

- high: from  $\pm 1.33$  to  $\pm 2.00$
- medium: from  $\pm 0.66$  to  $\pm 1.32$
- low: from  $\pm 0.01$  to  $\pm 0.65$ .

The data were tested to establish the feasibility of calculating different factors or scales from the 30 items by way of principle component analysis (PCA). This analysis yielded a 0.704 Kaiser-Meyer-Olkin value (exceeding the minimum recommended value of 0.600) and the Bartlett's test of sphericity reached statistical significance ( $p = 0.000$ ) (cf. Pallant 2007:190). Based on these results it was decided that it was appropriate to go ahead with PCA.

The PCA revealed four major components with eigenvalues exceeding 1, but for reasons of simplicity it was decided to extract only two major components. The two-component solution explained 32% of the variance, with Component 1 contributing 21% and Component 2 contributing 11% to the total variance. Oblimin rotation was performed and the rotated solution revealed that 25 out of the 30 items in the questionnaire loaded strongly on one of these two components: 12 items loaded on Component 1, coinciding largely with questions pertaining to evolution, whilst 13 items loaded on Component 2 and these largely (but not exclusively) coincided with questions about science and faith. Component 1 was therefore named the 'Evolution-Bible scale' and Component 2 the 'Science-faith scale'. For the purpose of this article *only* Component 1 (Evolution-Bible scale) will be discussed, whilst Component 2 (Science-faith scale) will be discussed separately in a future article.

**TABLE 1:** Evolution–Bible scale: Pattern matrix for principle component analysis.

Question	Description	Value
26	Evolution is basic to biology and should be taught at school.	0.824
21	Evolution is a godless theory that should be rejected.	-0.808
27	The fossil record is <i>not</i> convincing – too many gaps.	-0.806
18	Positive evaluation of evolution as one of the most successful modern theories of science.	0.744
16	Evolution is <i>just</i> a theory and cannot be proved.	-0.730
17	Evolution successfully explains small changes, but <i>not</i> changes into different species.	-0.688
22	Evolution is defined by biologists as an entirely random process and should be rejected because it cannot fully explain the complexities of life.	-0.608
25	Biblical creation should be interpreted in a symbolic (not literal) way.	0.594
13	Scientific theories are mere hunches.	-0.515
6	Choose scientific rather than biblical account of creation.	0.503
7	The Bible was <i>not</i> intended as a science handbook.	0.503
29	Evolution is driven by random mutations of which only the fittest survive. It is therefore an <i>indirect</i> adaptation to the environment.	0.418

Source: Data collected by author during present study

The way in which the various items loaded on Component 1 is summarised in Table 1. After the values for Questions 13, 16, 17, 21, 22 and 27 were reversed, all the values of the individual items in Table 1 were added together to compute an Evolution–Bible scale. To make the scale easier to interpret, the totals were divided by the number of items in the scale (12) to yield values between +2 and -2. When the scale was tested for reliability it returned a Cronbach-alpha value of 0.876, which is above the recommended minimum value of 0.700 (cf. Pallant 2007:98). When the scale was tested for normality the Kolmogorov-Smirnov test returned a significant result ( $p = 0.000$ ), indicating that the scale *does not* adhere to normality and that non-parametric tests should be preferred for analysis (Pallant 2007:62).

In the analysis of individual Likert scale items, the non-parametric Mann-Whitney U-test and Spearman correlations were used to calculate possible intergroup differences and correlations respectively. This was deemed necessary because individual items do not necessarily adhere to normality and because Likert scale questions measure interval data (cf. Coolican 2004:363).

The level of significance was set at 0.05, whilst, in most cases, only correlations above 0.2 and effect sizes for the Mann-Whitney U-tests above 0.20 will be reported. Adapting Cohen's (1988:79–81) categorisation of correlation strengths and effect sizes (Mann-Whitney U), the following categories will be used:

- low to medium: from  $r = 0.20$  to  $0.29$
- medium: from  $r = 0.30$  to  $0.49$
- high: from  $r = 0.50$  to  $1.00$ .

## Results

### Demographic attributes of participants

A total of 89 participants returned questionnaires, representing a return rate of 6.1%. Of the participants, 6.7% were women and 93.3% men, reflecting the relatively small number of women clergy and theologians in southern Africa within the Reformed tradition.

The participants were mostly from the mature age group, with 85.4% being above 40 years old. Most of the respondents (71.0%) resided in cities or big towns, whilst 18.0% stayed in

**TABLE 2:** Theological disciplines of study participants.

Discipline	Frequency	Percentage
New Testament	9	10.1
Old Testament	17	19.1
Missiology	8	9.0
Systematic Theology	19	21.3
Practical Theology	31	34.8
Church History	5	5.6
<b>Total</b>	<b>89</b>	<b>100</b>

Source: Data collected by author during present study

small towns or rural areas. Most participants (96.6%) were White, as a result of the population sampled.

Of the participants, 75.3% were clergy, whilst 16.9% were lecturers at universities. As to be expected, educational levels were high, with 74.1% of the participants having qualifications ranging from Bachelors to Masters or BD level, whilst 25.8% had doctoral degrees in theology.

The disciplines of specialisation (or of main interest) of participants represented all major theological disciplines (see Table 2 for frequencies). Most of the participants specialised or were interested in Practical Theology (40.7%).

### Evolution–Bible scale

The mean score for the calculated Evolution–Bible scale was 0.72 (SD = 0.65;  $n = 88$ ). This mean score reflected a *medium level of agreement*, but with a relatively large variation in opinions from negative to positive. This is illustrated by the high standard deviation and the large range of opinions (minimum score: -1.58; maximum: +1.92). However, on average the participants expressed positive opinions about evolution as a scientific theory. This opinion was closely linked to the following views:

- The biblical creation narratives should be interpreted in a more symbolic (not literal) way (cf. Question 25).
- The Bible is not a science handbook (Question 7).
- The scientific rather than the biblical account of creation should be preferred as the more accurate account of the origin of the cosmos (cf. Question 6).

A Mann-Whitney U-test revealed a significant difference in opinions on the Evolution–Bible scale between lecturers and

clergy ( $U = 366.5$ ;  $Z = -2.013$ ;  $p = 0.044$ ), with a *low to medium* effect size ( $r = 0.21$ ). Although both lecturers and clergy were positively inclined towards evolution, the median score of lecturers (median = 1.16;  $n = 15$ ;  $SD = 0.57$ ) on the scale was much *higher* than those of the clergy (median = 0.83;  $n = 73$ ;  $SD = 0.65$ ). This significant difference suggests that lecturers were more positively inclined towards evolution and thought that the biblical creation narratives should not be interpreted in a literal way, because the Bible is not a science handbook.

## Individual Likert items

### Question 15: Darwinian evolution explains how organisms adapt directly to their environment (e.g. giraffe's long neck)

The majority of the participants (68.5%) *agreed*, whilst 10.1% were uncertain and 21.3% *disagreed* with the statement. On average the participants expressed a *low level of agreement* (mean = 0.52;  $SD = 1.15$ ;  $n = 89$ ). The high standard deviation is an indication that participants differed in their opinions about this statement.

This question assessed to what extent participants' opinions adhere to the popular misconception amongst non-biologists that Darwinian evolution can be equated with direct adaptation to the environment (or inheritance of acquired attributes), as suggested by Darwin's predecessor, the French scholar Jean Baptiste de Lamarck. Darwin's suggested mechanism of adaptation (natural selection) was proposed as a direct criticism of Lamarck and is today accepted by most biologists as correct (cf. Holdrege 2003:14–19). The fact that many participants agreed with this *inaccurate* statement, without realising that it contradicts the *accurate* summary of indirect biological evolution in Question 29, suggests that not all participants appreciated this important distinction between direct and indirect adaptation within modern evolutionary theory. This conclusion is further supported by the significant correlation between Questions 15 and 29 (Spearman rho = 0.275;  $p = 0.01$ ;  $n = 88$ ). However, the fact that this correlation is only of low strength suggests that at least some of the participants may have appreciated the important difference between Questions 15 and 29.

The incorrect view of Darwinian evolution, as reflected in Question 15, also significantly correlated (medium strength) with another mistaken misconception about evolution as expressed in Question 28 – that biologists regard evolution is a preconceived or deliberate plan (Spearman rho = 0.444;  $p < 0.00$ ;  $n = 89$ ). This implies that many of the participants who could not correctly describe the mechanism of adaptation in evolution also mistakenly thought that evolution (as described by biologists) is a teleological process (compatible with intelligent design).

### Question 16: Biological evolution is just a theory that cannot be proved

Most participants (79.8%) *disagreed* on a *medium level* of disagreement (mean = -0.76;  $SD = 0.90$ ;  $n = 89$ ) with the statement. This disagreement indicates a basically positive

view of evolution by not trying to devalue it to 'just a theory', as is often attempted in creationist circles (cf. Chandra 2007:n.p.; Dawkins 2009:1–18).

An interesting *positive* correlation existed between this question and the next question (Question 17) – that evolution can only explain small changes, but *not* the development into new species (Spearman rho = 0.404;  $p < 0.00$ ;  $n = 89$ ). This indicates that those participants who had a *negative* view of evolution (i.e. that it is just a theory) also thought that evolution could only explain small changes, but *not* the development into new species. The reverse would imply that participants with a *positive* view of evolution (it is more than just a theory) on average also thought that evolution could explain major biological changes (e.g. speciation).

### Question 17: Evolution can explain small changes, but not development into new species

This question prompted very different reactions from the participants, with 44.9% *disagreeing* with the statement, 13.5% being unsure and 41.6% *agreeing*. This resulted in a very *low overall level* of agreement (mean = 0.04;  $SD = 1.15$ ;  $n = 89$ ). The view that evolution is of limited explanatory value and that it can only explain small changes, but not the differentiation into different species, is an especially popular view amongst fundamentalist Christians. The reason for this is because it allows one to acknowledge some elements of truth in the evolutionary theory (e.g. old earth creationism), whilst limiting it so that it does not explicitly contradict the biblical record of creation, which reckons with the simultaneous creation of all species. This result therefore suggests that a sizeable proportion of the participants (55.1%) either agreed with this popular fundamentalist sentiment, or was uncertain about the statement.

A significant difference in opinion was expressed between lecturers versus clergy regarding the possible limitations of evolution (Mann-Whitney  $U = 366.0$ ;  $Z = -2.188$ ;  $p = 0.029$ ; low to medium effect size:  $r = 0.23$ ). On average, lecturers *disagreed* with the statement (mean = -0.53;  $SD = 0.99$ ;  $n = 15$ ), whilst clergy *agreed* with the statement with a *low level* of agreement (mean = 0.16;  $SD = 1.14$ ;  $n = 74$ ). Members of the clergy were therefore much more inclined to limit the explanatory value of evolution and to thereby avoid the explicit contradiction with the biblical creation narratives, whilst lecturers were, to a larger extent, supportive of Darwinian evolutionary theory.

### Question 18: Evolution should be viewed in a positive way, because it is one of the most successful theories of modern science

The majority of the participants (71.9%) *agreed* with the statement, with a *low to medium level* of agreement (mean = 0.62;  $SD = 0.92$ ;  $n = 89$ ). This suggests that by far the majority of the participants were positively inclined towards evolutionary science, irrespective of faith considerations. This interpretation is supported by the significant *negative* correlation with Question 16 (Spearman rho = -0.463;  $p < 0.00$ ;  $n = 89$ ) (evolution is just a theory).

**Question 19: Biologists view evolution as progress towards higher forms, which can be seen as God's guidance**

A 73.0% *agreement* with the statement and a *medium level* of agreement (mean = 0.88; SD = 1.08;  $n = 89$ ) suggests that the participants were fairly convinced that biologists define evolution as progress towards higher forms of life and that this progression can be seen as divine guidance. This result suggests that most participants did not necessarily realise that biologists do not define evolution as a teleological process. The idea of progression in evolution is an onerous concept, strongly rejected by many biologists, primarily because it is not clear in terms of which attributes such progression could be defined and because of the circular nature of such arguments (cf. Van Dyk 2001:157–164; Williams 1966:35–49).

**Question 20: Evolution can be compatible with faith, because it explains the fact that humans are the highest life form**

Opinions about this statement varied with 51.7% who *agreed*, 12.4% who were unsure and 36.0% who disagreed – yielding a *low level* of agreement (mean = 0.13; SD = 1.16;  $n = 89$ ). The varied result and high standard deviation suggest that a sizeable group of the participants (48.2%) found the statement problematic. The statement could be regarded as problematic on two possible accounts, (1) from a scientific point of view many biologists would find the idea that humans are the highest life form problematic because of the circularity involved in these kind of arguments (see discussion above in Question 19) and (2) some participants may also have found the linkage between evolutionary theory and faith problematic. However, the fact that a slight majority agreed with the statement shows that this popular *misconception* about evolution (i.e. that it could be used to illustrate the superior position of humans within the natural world) is relatively prevalent amongst clergy and theologians.

**Question 21: Evolution is a godless theory, which should be rejected in its entirety**

Most participants (89.9%) *disagreed* with the statement with a *medium to high* level of disagreement (mean = -1.29; SD = 0.93;  $n = 89$ ). This result suggests that the large majority of the participants did *not* think that evolution was necessarily bad or that the theory excludes God or that it should be rejected entirely. However, the statement could also be interpreted differently. If the word 'godless' was not interpreted as meaning bad or evil, but as a scientific theory which do not take supernatural causes into account (i.e. as a theory 'without God'), one could have agreed with the first part of the statement and disagreed with the last part about rejecting evolution. However, the overwhelming disagreement with the statement makes this interpretation by participants unlikely.

**Question 22: Biologists define evolution as an entirely random process and it should therefore be rejected, because it cannot explain the complexities of life**

Most of the participants (73.0%) *disagreed* with the statement. On average, the participants expressed a *medium level* of

disagreement (mean = -0.69; SD = 1.03;  $n = 89$ ). All three parts of the statement could be regarded as *incorrect*:

- No biologist would define evolution as an entirely random process, because of the feedback mechanisms from the environment built into the theory (cf. Dawkins 2009:357–371).
- Evolution should not be rejected.
- Evolution can explain the complexities of life: when one takes the complex feedback from the environment into account, the long period of development through trial and error and the fact that the development of complex biological systems could be explained by breaking it up into different steps (cf. Dawkins 2009:416 for detailed arguments to this regard).

**Question 23: If (in contrast to biological views) evolutionary development is explained as a guided process (e.g. by God) towards a specific goal, it can explain the complexities of life**

The majority (69.7%) of participants *agreed*, whilst 22.5% disagreed with this statement. On average the participants expressed a *low level* of agreement (mean = 0.53; SD = 1.05;  $n = 89$ ). The fact that most participants agreed with the statement suggests that they saw evolution as a guided or teleological process, probably in the intelligent design sense of the word. The low level of agreement and high standard deviation suggest, however, that some participants may have been confused by the fact that the statement deliberately contrasted the religious teleological view of evolution with that of biologists or by the fact that it was deliberately posed as the counterpart to the previous question (Question 22). Both questions dealt with how the complexities of life could be explained in terms of evolution. In Question 22, it was incorrectly suggested that the non-guided biological view of evolution cannot explain the development of complex life, whilst Question 23 suggested that if evolution is defined differently (i.e. as a guided process) it could supposedly 'rectify' this 'failure' of secular evolution and 'succeed' in explaining the complexities of life (for an opposite view, see Dawkins 1996). It is probable that at least some of the participants appreciated this link between Questions 22 and 23, as is suggested by the *positive* correlation between Questions 22 and 23 (Spearman  $\rho = 0.243$ ;  $p = 0.02$ ;  $n = 89$ ), although of low strength. This result suggests that those participants who thought that secular evolution cannot explain the complexities of life also thought that such complexities could be explained if evolution is reinterpreted as a teleological process of design by God.

**Question 24: If the Genesis days are not taken as strictly 24-hour periods, they can be interpreted as long periods of development**

Most (88.8%) of the participants *agreed* with the statement, with a *medium to high level* of agreement (mean = 1.21; SD = 0.91;  $n = 89$ ). The result suggests that an overwhelming majority of participants regarded the days in the Genesis 1 creation narrative not necessarily as literally 24 hours, but thought that these days could be re-interpreted as long

periods of development that would then not necessarily contradict evolution. This result can be interpreted in either a positive or negative way. On the one hand, the result could be judged as the rejection of fundamentalist creationist interpretations of the biblical creation narrative. On the other hand, it could reflect an underlying assumption that, if interpreted correctly, the Bible does not necessarily contradict the current scientific cosmology, which is unlikely in the light of the Bible's pre-scientific and magico-mythical cosmology which it shared with the ancient world (cf. Bultmann 1984:9; Gadamer 1989:273; Van Dyk 2009:5–6).

There was a significant difference in opinions between Old Testament (OT) and New Testament (NT) lecturers versus the rest of the participants (Mann-Whitney  $U = 187.5$ ;  $Z = -2.134$ ;  $p = 0.033$ ) with a low to medium effect size ( $r = 0.23$ ). OT and NT lecturers were much less inclined to agree with the statement (mean = 0.22; SD = 1.3;  $n = 9$ ) than the other participants (mean = 1.33; SD = 0.79;  $n = 80$ ). The high standard deviation for OT and NT lecturers, however, suggests that they differed also amongst themselves. As was to be expected, there was a significant positive correlation (medium strength) between this question and the next one (Question 25) (Spearman rho = 0.477;  $p < 0.000$ ;  $n = 89$ ).

#### **Question 25: The biblical creation account should be interpreted in a more symbolic (not literal) way**

The majority of the participants (87.6%) *agreed* with the statement. This resulted in a *medium* overall level of agreement with the statement (mean = 1.29; SD = 0.97;  $n = 89$ ). This result reflects the (formally) non-fundamentalist views of most participants in that they were willing to interpret the biblical creation narratives in a non-literal way.

There was also a positive correlation (medium strength) with Question 26 (Spearman rho = 0.434;  $p < 0.000$ ;  $n = 89$ ), indicating that participants who interpreted the biblical creation narratives in a non-literal way, also thought that evolution is a basic scientific theory and should be taught at school.

#### **Question 26: Evolution is basic to all modern biology and should be taught at school**

Participants had mixed opinions about this statement. A slight majority (52.8%) *agreed*, whilst 18.0% were unsure and 29.2% disagreed. The level of agreement was low (mean = 0.21; SD = 1.21;  $n = 89$ ). The result suggests that a sizeable number of participants (47.2%) were not sure, or disagreed with either the fact that evolution is a basic assumption of all modern biology, or that it should be taught at school.

There was a significant difference between clergy and lecturers with regard to this statement (Mann-Whitney  $U = 325.5$ ;  $Z = -2.639$ ;  $p = 0.008$ ), with a small to medium effect size ( $r = 0.28$ ). Lecturers tended to agree more with the statement (mean = 0.93; SD = 0.96;  $n = 15$ ), whilst members of the clergy were much less sure about it (mean = 0.068; SD = 1.21;  $n = 74$ ).

There were medium to high strength *negative* correlations between Question 26, on the one hand, and the following questions: Question 16 (Spearman rho = -0.535;  $p < 0.000$ ;  $n = 89$ ), Question 17 (Spearman rho = -0.512;  $p < 0.000$ ;  $n = 89$ ), Question 18 (Spearman rho = -0.528;  $p < 0.000$ ;  $n = 89$ ), Question 21 (Spearman rho = -0.632;  $p < 0.000$ ;  $n = 89$ ), Question 22 (Spearman rho = -0.379;  $p < 0.000$ ;  $n = 89$ ) and Question 27 (Spearman rho = -0.741;  $p < 0.000$ ;  $n = 89$ ). An *agreement* with the positive sentiment regarding evolution as expressed in Question 26 therefore was correlated with a *disagreement* with all the abovementioned questions expressing negative views about evolution. This result supports the evaluation that most participants basically expressed a positive opinion about evolution and thought that it does not necessarily contradict the biblical record – if interpreted non-literally (as was also suggested by the Evolution–Bible scale).

#### **Question 27: The fossil record is not convincing in suggesting the correctness of evolution, because it has too many gaps**

Participants were not very sure about this question, with 49.4% *disagreeing*, 14.6% being unsure and 36.0% who agreed. On average participants therefore had a very *low level* of disagreement (mean = -0.13; SD = 1.21;  $n = 89$ ). This result suggests that a slight majority of participants (50.6%) were either unsure or not convinced about the adequacy of the fossil record in attesting to the correctness of biological evolution. This is an indication that the common misconception about the supposed inadequacy of the fossil record (as is often repeated by the creationist movement) also had an effect on South African clergy and theologians (cf. Dawkins 2009: 100–101, 145–180).

There was a significant difference in the views between clergy and lecturers on this question (Mann-Whitney  $U = 339.0$ ;  $Z = -2.472$ ;  $p = 0.013$ ), with a small to medium effect size ( $r = 0.26$ ). Lecturers, on average, *disagreed* (medium level of disagreement) with the statement (mean = -0.80; SD = 1.21;  $n = 15$ ), whilst clergy were, on average, *unsure* about the matter (mean = 0.00; SD = 1.17;  $n = 74$ ). This suggests that lecturers were much more convinced by the fossil record (as support for evolution) than clergy.

#### **Question 28: Evolution is a deliberate 'plan' (built into nature) to improve fitness**

Most participants (64.0%) *agreed* with the statement, whilst 18.0% were unsure and 18.0% disagreed. This yielded a *low level* of agreement (mean = 0.51; SD = 0.95;  $n = 89$ ). The result thereby supports the previously mentioned conclusion that many of the participants either did not appreciate the difference between a teleological and a secular interpretation of evolution, or, alternatively, that they thought that the secular version of evolution needed to be adapted to the faith perspective. This fallacy, that nature (and thus evolution) has a clearly identifiable purpose or design, which could be compared with the workings of a watchmaker, was first proposed by the natural theologian William Paley (n.d.) in the early 1800s. Richard Dawkins (1986, 2009:357–371) has,

however, forwarded a number of convincing arguments from a biologist's perspective against this kind of historicism. Although it is true that the general effect of evolution is to improve fitness to a changing environment, this fact should, according to biologists, not be seen as a deliberate preconceived plan or a form of design.

Opinions about the supposed plan imbedded in evolution diverged significantly between lecturers versus clergy (Mann-Whitney  $U = 325.0$ ;  $Z = -2.795$ ;  $p = 0.005$ ), with a medium effect size ( $r = 0.30$ ). Lecturers were, on average, probably more knowledgeable about the possible problems posed by viewing evolution in a teleological way, as is suggested by the fact that they *disagreed* with the statement (mean =  $-0.13$ ;  $SD = 1.06$ ;  $n = 15$ ), whilst clergy, on average, *agreed* with the statement (mean =  $0.64$ ;  $SD = 0.88$ ;  $n = 74$ ).

Significant *positive* correlations (medium strength) existed between Question 28 and the following: Question 15 (Spearman  $\rho = 0.444$ ;  $p < 0.000$ ;  $n = 89$ ), Question 19 (Spearman  $\rho = 0.363$ ;  $p < 0.000$ ;  $n = 89$ ), Question 20 (Spearman  $\rho = 0.337$ ;  $p = 0.001$ ;  $n = 89$ ) and Question 23 (Spearman  $\rho = 0.346$ ;  $p = 0.001$ ;  $n = 89$ ). These positive correlations suggest that those participants who supported the mistaken view that biologists define evolution in a teleological way also tended to adhere to other popular misconceptions regarding evolution as expressed in the above-mentioned questions.

**Question 29: Evolution is driven by random mutations, of which only the fittest survive. It is therefore not entirely random, but an indirect form of adaptation**

Most participants *agreed* with the statement (69.7%), but a fair number was unsure (16.9%) or disagreed (12.4%), with a low to medium level of agreement (mean =  $0.57$ ;  $SD = 0.87$ ;  $n = 88$ ). This suggests that most participants agreed with this accurate description of biological evolution, although many did not appreciate the fact that it contradicts Question 15, as is suggested by the positive rather than negative correlation between the two questions (see details in Question 15).

**Question 30: The scientific theory of evolution does not reckon with a higher guiding principle. A religious person can therefore only accept this in faith and not prove it**

Most participants *agreed* with this statement (66.3%), whilst 9.0% were unsure and 24.7% disagreed, with an overall low to medium level of agreement (mean =  $0.56$ ;  $SD = 1.15$ ;  $n = 89$ ). The question assessed the participants' appreciation of the fact that most scientists do not reckon with a higher guiding principle as part of the scientific theory of biological evolution (e.g. Dawkins 2009:100–101) and that such guidance is not demonstrable in any scientific way, but could only be accepted in faith (see the fourth viewpoint in the subsection above entitled 'Possible opinions about evolution and faith'). The fact that this question may imply a contradiction with Question 19 should logically have resulted in a negative correlation between Question 30 and Question 19. There was, however *no* correlation between the two questions (Spearman  $\rho = -0.003$ ;  $p = 0.979$ ;  $n = 89$ ), suggesting that participants

had no clear view of exactly which premises belong to the scientific theory of evolution and which belongs to the faith cadre.

## Discussion

### Outline of the results

The positive measurement on the Evolution–Bible scale suggests that most participants from the Reformed Christian tradition in southern Africa expressed a positive opinion about evolution, because they were convinced that evolution is a sound scientific theory and does not necessarily contradict the biblical creation narratives, if these are not interpreted in a too literal way (cf. Question 24). This generally positive evaluation of evolution was illustrated by the fact that most participants agreed that evolution is *not* just a theory (Question 16), participants agreed that evolution should be regarded in a positive way, because it is one of the most successful theories of modern science (Question 18) and participants, on average, disagreed strongly with the fact that evolution should be seen as a godless theory that should be rejected entirely (Question 21).

The generally positive view of evolution was, however, to some extent 'diluted' by more mixed opinions or uncertainties expressed about evolution, as was evident from the mixed results on the following questions, which expressed doubt about some of the basic tenets of evolutionary theory: 'Evolution could explain only minor adaptive changes and not necessarily differentiation into different species' (Question 17: 55.1% of the participants were uncertain or agreed), 'Evolution should be viewed as basic to modern biology and should therefore be taught at school' (Question 26: 18.0% were unsure and 29.2% disagreed) and 'The fossil record is *not* adequate to support evolution' (Question 27). Of the participants, 14.6% were unsure about the adequacy of the fossil record and 36.0% thought that it was inadequate.

Most participants were ignorant of the finer nuances of the scientific theory of evolution, as is suggested by the fact that they made no distinction between direct and indirect adaptation to the environment (cf. Questions 15 and 29). This implies that they did not have a clear view of the fundamental difference biologists make between the Darwinian mechanism of natural selection (indirect adaptation) and Lamarckism, which suggested a form of direct adaptation to the environment (Holdrege 2003:14–19).

Most participants agreed with the teleological view of evolution. Although more than 66.0% of the participants agreed that this purposefulness in nature could only be accepted in faith and not be proven (Question 30), the results from other questions suggest that the implication of this statement was not always appreciated. Although Questions 19, 23 and 28 were supposed to contradict the view in Question 30, most participants nonetheless agreed with them, not making the finer distinction between how biologists describe evolution (as a non-teleological process) in contrast to the

way many theologians interpret it as a guided process. They also did not clearly distinguish between accepting evolution as a guided process in faith only, or the suggestion that this supposed guidance or plan in evolution could clearly be demonstrated or proven – as earlier suggested by Natural Theology and currently implied by most forms of intelligent design.

Most participants expressed strong non-fundamentalist views about the Bible by suggesting that the biblical creation record should not be read in a too literal way (Questions 24 and 25). Other results from the survey suggest that some participants only nominally agreed with non-fundamentalist views, whilst secretly harbouring some remnants of fundamentalist sentiments. The opinion that the Bible is not necessarily contradictory to evolutionary science (as is suggested by the opinions expressed in Questions 20 and 24), may suggest that at least some participants tried to reconcile biblical and evolutionary ideas (which is typical of fundamentalism). For example, 51.7% of the participants agreed with the view that the biblical idea that humans are ‘the crown of creation’ agrees with the popular misconception that humans can be regarded as the high point (purpose) of evolution. In general, lecturers were better informed about evolutionary theory than clergy and were more positively inclined towards it (cf. Questions 17, 24, 26, 27 and 28).

### Limitations and future research

The present study only investigated opinions about evolution amongst members of the Reformed church tradition, who were mostly White men. A future survey amongst southern African theologians and clergy could include other church traditions, more female participants and people from other ethnic groups. Such a more comprehensive study may reveal potential differences between members of different denominations and between ethnic and gender groups. Future surveys should also attempt to distinguish more clearly between views regarding evolution, which depends entirely on faith, versus attempts to prove some form of design or purpose in the cosmos.

### Conclusion

In essence, this study revealed that most participants were positive about evolution, although they had convoluted or mistaken views about the finer aspects of evolutionary theory. The results further suggested that there was a general lack of distinction between accepting divine design of the cosmos in faith, versus trying to demonstrate or prove

such design. It is exactly such a lack of distinction between what belongs to science and what belongs to faith that often becomes problematic in the science–faith debate.

## Acknowledgements

### Competing interests

The author declares that he has no financial or personal relationships that may have inappropriately influenced him in writing this article.

## References

- Bultmann, R., 1984, *New Testament and mythology and other basic writings*, Fortress Press, Philadelphia.
- Chandra 2007, ‘It is not just a theory... It is a theory!’, viewed 16 April 2012, from <http://chandra.harvard.edu/chronicle/0308/theo/>
- Cohen, J.W., 1988, *Statistical power analysis for the behavioral sciences*, 2nd edn., Lawrence Erlbaum Associates, Hillsdale.
- Coolican, H., 2004, *Research methods and statistics in psychology*, 4th edn., Hodder & Stoughton, London. PMID:15094139
- Darwin, C., [1859] 1968, *The origin of species by means of natural selection*, Penguin, London.
- Dawkins, R., 1986, *The blind watchmaker*, Norton, New York.
- Dawkins, R., 1996, *Climbing mount improbable*, Norton & Company, New York.
- Dawkins, R., 2006, *The God delusion*, Bantam Press, London.
- Dawkins, R., 2009, *The greatest show on earth. The evidence for evolution*, Bantam Press, London.
- Fairchild, M., n.d., ‘What is the gap theory? Exploring gap creationism, or ruin-reconstruction theory’, viewed 03 July 2012, from <http://christianity.about.com/od/topicalbiblestudies/a/Gap-Theory.htm>
- Gadamer, H.-G., 1989, *Truth and method*, 2nd edn., transl. J. Weinsheimer & D.G. Marshall, Sheed & Ward, London.
- Gay, P., 1966, *The Enlightenment: An interpretation. The rise of modern paganism*, Weidenfeld & Nicolson, London.
- Hill, S., 2012, *Anti-science agendas invade the schools; not just creationism anymore*, viewed 06 June 2012, from <http://doubtfulnews.com/2012/02/anti-science-agendas-invade-the-schools-not-just-creationism-anymore/>
- Hitchens, C., 2007, *God is not great. How religion poisons everything*, Atlantic Books, London.
- Holdrege, C., 2003, ‘The giraffe’s short neck’, *In Context* 10, 14–19, viewed 03 July 2012, from <http://natureinstitute.org/pub/ic/10/giraffe.htm>
- Miller, J.D., Scott, E.C. & Okamoto, S., 2006, ‘Public acceptance of evolution’, *Science* 313(5788), 765–766. <http://dx.doi.org/10.1126/science.1126746>, PMID:16902112
- Moran, L.A., 2011, *Sandwalk. Strolling with a skeptical biochemist. Is creationism anti-science?*, viewed 06 June 2012, from <http://sandwalk.blogspot.com/2011/10/is-creationism-anti-science.html>
- Newport, F., 2010, *Four in 10 Americans believe in strict creationism*, viewed 03 July 2012, from <http://www.gallup.com/poll/145286/four-americans-believe-strict-creationism.aspx>
- Paley, W., n.d., *Natural theology*, Richard Griffen, London.
- Pallant, J., 2007, *SPSS survival manual. A step by step guide to data analysis using SPSS for Windows*, 3rd edn., Open University Press, Maidenhead.
- University of Cambridge, 2012, *Darwin & the church*, viewed 03 July 2012, from <http://www.darwinproject.ac.uk/darwin-and-the-church-section>
- Van Dyk, P.J., 1993, ‘Evolusie: Die misverstand tussen teologie en biologie’, *Hervormde Teologiese Studies* 49(1&2), 221–295.
- Van Dyk, P.J., 2001, *A brief history of creation*, Unisa Press, Pretoria.
- Van Dyk, P.J., 2009, ‘Creation, temple and magic. A magico-mythical reading of Genesis 1’, *Old Testament Essays* 22(2), 422–436.
- Williams, G.C., 1966, *Adaptation and natural selection. A critique of some current evolutionary thought*, Princeton University Press, Princeton.