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## Does Evolution matter? A case study in Brazil of the effects of an evolutionary-thinking academic atmosphere in postgraduate students' belief in God/religious belief

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### ABSTRACT

Although the theory of evolution is more than 150 years old, a substantial proportion of the world population does not mention it when explaining the origin of human beings. The usual alternative conception is offered by creationism, one of the main obstacles to full acceptance of evolution in many countries. National polls have demonstrated that schooling and religiosity are negatively correlated, with scientists being one of the least religious professionals. Herein we analyzed both (1) the profile of 1st semester undergraduate students and (2), thesis and dissertations, concerning religious and evolutionary thoughts from Biology and Veterinary Schools at the largest university of South America. We have shown that students of Biology are biased towards evolution before they enter university and also that the presence of an evolutionary-thinking academic atmosphere influences the deism/religiosity beliefs of postgraduate students.

**Key words:** creation-evolution controversy, deism/religiosity, evolutionism, postgraduate students.

### INTRODUCTION

Around 150 years after the publication of *On the origin of species* by Charles Darwin, evolution still faces difficulties to be plainly adopted worldwide (Miller et al. 2006). The resistance and opposition offered by the creationist religious tradition are among the main obstacles to full acceptance of evolution in many countries (Scott 1997, Miller et al. 1997, 2006). In fact, this dualism creationism/evolution occurs among scholars of several areas (Leuba 1916, Larson and Witham 1997, 1998).

One of the keys to enhancing the public acceptance of evolution and also contributing to make concepts and ideas in biological sciences more comprehensible to the general public is teaching evolution, both in K-12 and college levels. Still, this has not resulted in a consolidated scientific formation/belief of many people around the world (Miller et al. 2006). In Brazil, 25% of the population does not refer to the evolutionary theory when explaining the origin of human beings, relying on creationist explanations of a God that has created us the way we are today, at some point in the last ten thousand years; 59% set our origins back some millions of

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years ago, but still give to God the guider role of this evolutionary process; only 8% of Brazilians explain human origins from ancestral species independently of a divine creation (Datafolha 2010).

Few studies have focused on the belief in God or religiosity among academically higher educated people (having a university degree), although they all show a recurring tendency of less religiosity and higher atheism in this group (Leuba 1916, Larson and Witham 1997, 1998). Reiss (2009) speculated that there are more creationist students in universities in biology courses than it is sometimes realized, although this number has not been quantified. To what extent formal evolutionary courses as well as an evolutionary-thinking academic atmosphere (i.e., students and scholars having evolutionary papers and practice, talks, and general outreach in their quotidian) may influence people's deistic/religious beliefs has never been assessed to date.

The goal of this study was to assess the influence of this evolutionary-thinking academic atmosphere on the deism (=belief in God)/religiosity expression among higher educated people, postgraduate students (graduate students in USA) in the largest university of South America, the University of São Paulo in Brazil.

## MATERIALS AND METHODS

We carried out a documentary research based on Masters Theses and PhD Dissertations defended at the University of São Paulo (USP) between 1943 and 2009 in two of its academic units, the Biosciences Institute (IB-USP, hereafter called Biology School) and the Veterinary Medicine and Husbandry Faculty (FMVZ-USP, the Veterinary School). These courses were chosen as representatives of Brazilian scientific academy on biological sciences because of their similar characteristics: (1) both are in the biological sciences field (2) dealing with non-human study-objects, (3) they have similar time span existence; (4) they present similar postgraduate students'

socioeconomic profiles. Confounding variables were considered to be randomly distributed among the two groups. A total number of documents were analyzed, 2778 MSc theses (1446 Biology and 1378 Veterinary) and 2046 PhD dissertations (1332 Biology and 668 Veterinary). The data were extracted from three initial sections of the documents, viz. the epigraph(s), dedication(s) and acknowledgements, section in which authors generally include information escaping from scientific templates. In these sections, we have searched for direct or indirect mentions and references to "God" or supernatural forces/entities, explicitly or implicitly included. This kind of mention in each document was considered as author's deism/religiosity expression.

To minimize the effects of the influence of students opinion before they entered the University, we had 1<sup>st</sup> semester undergraduate students in 2011, both from Biology and Veterinary, answering the question "Which of the following phrases is closer to your opinion about the origin and historical development of human beings? (mark only one phrase)": Human beings developed in the last millions of years from less advanced forms of life, with the participation of God in the process; Human beings developed in the last millions of years from less advanced forms of life, but with no participation of God in the process; God has created human beings similar to what they look like today, at some point in the last 10000 years or something close to that. These questions were the same used in a questionnaire made by the Brazilian newspaper Folha de São Paulo (Datafolha 2010). According to their answers, students were considered to be favorable to evolution, intelligent design and creationism, respectively.

## RESULTS

Out of the 2778 documents of the Biology School, 8.3% of the MScs and 7.5% of the PhDs presented deist/religious mentions in the analyzed sections, whereas in 2056 documents of the

Veterinary School these indexes were 38.8% and 34.1% respectively. There is no significant difference between the MSc and the PhD postgraduation levels in each unity ( $\chi^2 = 0.36$ , DF = 1, P = 0.547), but there is a significant difference between Biology and Veterinary (8.1% and 37.7% respectively;  $\chi^2 = 399.43$ , DF = 1, P < 0.001).

The results of the interview with 1<sup>st</sup> semester undergraduate students showed that at least in 2011 those beginning the Biology course are already significantly less religious than those entering the Veterinary course (percentages of answers favorable to design/evolution/creationism Vet, n = 57: 45.6%; 49.1%; 5.3% and Bio, n = 101: 19.8%, 79.2%, 1% –  $\chi^2 = 15,79$ , DF = 2, P < 0.001).

#### DISCUSSION

Both the 8% of deism/religiosity expression in Biology against 38% in Veterinary show lower percentages of religious beliefs than that observed for the Brazilian population in general – 84% (Datafolha 2010). Several studies have suggested that scientists are less religious than lay people, with some asymmetry within the social and professional group of scientists as well (see Larson and Witham 1997, 1998 and references therein). For instance, the highest proportion of deism/religiosity in the National Academy of Sciences of USA was among mathematicians (14.3%), then physicists and astronomers (7.5%) and biology scientists (5.5%) (Larson and Witham 1998). The lower incidence of religious/deist beliefs among scholars might be the result of science's explanatory power on the origins of life and human beings through natural selection. Biologists would tend to be the least religious because of their "raised consciousness" dissatisfied with any deistic explanation (Dawkins 2006).

Although expressions of deism/religiosity may be underestimated because religious students of both Bio and Vet may have omitted religion in their writings exactly for being in an "evolutionary atmosphere", our results are clear in showing a remarkable difference

in religiosity between these two schools. They show two non-excluding, and possibly additive, sources of variation about evolutionary/religious thoughts when comparing Veterinary and Biology schools. The first one is the fact that biology students are already biased towards evolution; but a second factor is also important: the presence of an evolutionary-thinking academic atmosphere in the graduation and post graduation.

The main difference between Biology and Veterinary Schools is exactly the different stress on evolutionary biology the two courses have: an evolutionary perspective is found in most of Biology research, teaching and other academic activities and, consequently, these values and ideas may underpass to postgraduate students' social and relational life, and beliefs. Therefore, it is possible that evolution may be playing an important role in individuals' religiosity/belief in God: not only the study and practice of evolution, but also the immersion in this evolutionary-thinking academic atmosphere may have influenced individuals to express less deism and less religiosity than they would in an environment absent of it. Extrapolating to general educational levels, this important role for such evolutionary-thinking atmosphere may be assumed also in pre-university levels in order to increase the scientific understanding of Biological Sciences in general.

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**RESUMO**

Embora a teoria da evolução tenha mais de 150 anos, uma proporção substancial da população mundial não se refere a ela para explicar a origem dos seres humanos. A alternativa conceitual usual é oferecida pelo criacionismo, um dos principais obstáculos à aceitação plena da Evolução em muitos países. Pesquisas nacionais demonstraram que nível de instrução e religiosidade estão correlacionados negativamente, com os cientistas como sendo um dos profissionais menos religiosos. Aqui analisamos tanto (1) o perfil dos calouros do 1º semestre de 2011 como (2) as teses e as dissertações, com relação à expressão de concepções religiosas e evolutivas, das faculdades de Biologia e Veterinária da maior universidade da América do Sul. Demonstramos que os estudantes de Biologia tendem ao evolucionismo antes mesmo de entrar na universidade e que a presença de uma atmosfera acadêmica evolucionista influencia a expressão de deísmo/religiosidade entre os estudantes de pós-graduação.

**Palavras-chave:** controvérsia criacionismo-evolucionismo, deísmo/religiosidade, evolução, estudantes de pós-graduação.

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