Is Darwin dangerous?

Museums, media, and public understanding of evolution

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Abstract: *What defines a topic as controversial? How does one measure its significance? Is it what commentators find controversial, what a majority of people think, or what generates the most heated debates? There is general consensus that evolution has been a controversial topic since the mid-nineteenth century. The scientific debate was settled in the 1930s with the modern synthesis bringing genetics and the theory of evolution by natural selection together within a single theoretical framework. The public debates, however, continued, mainly due to religiously motivated anti-evolution activists. The conflict narrative of science and religion with evolution versus creation has been – and still is – a particular favourite with the press. Consequently, the media is complicit in maintaining evolution as a controversial topic. This is the reality natural history museums have to deal with when communicating evolution. The question is whether it makes any difference which strategies museums take and, if so, whether it is possible to measure the difference. The authors discuss the role natural history museums have in the public discourse of evolution by looking at the different approaches in 2009 to the celebrations of the 150th anniversary of the publication of the *Origin of Species* and the 200th anniversary of Charles Darwin's birth, comparing it to the media coverage of the events in the Scandinavian countries.*

Key words: Evolution, human origins, natural history museums, exhibitions, news media, public understanding of science, creationism, Charles Darwin.

MUSEUMS AND PUBLIC EVOLUTION DEBATES

Museum collections contain lots of evidence for the theory of evolution. Specimens like fossils from different time periods, species of animals or plants, or samples of DNA from various organisms, are crucial to our scientific understanding of life on earth. The evolutionary

process is central to almost any scientist in the natural history disciplines whether working on the dating of geological strata, biosystematics, taxonomy, or genetics. For a natural history museum to engage in the communication and interpretation of the theory of evolution is therefore an obvious and relevant decision, and has been an integral part of museum

pedagogy since the late nineteenth century (Falk & Dierking 2000, Asma 2003, Bennett 2004, Adelman 2005, MacGregor 2009).

Evolution, however, can be a controversial issue and to some it has even been considered a dangerous idea (Dennett 1995). It has a long history of debate going back to eighteenth-century ideas about transmutation of species. The Darwinian theory of evolution by natural selection is part of that history, but the context for public, religious, and scientific discussions were already in place by the time of the publication of the *Origin of Species* in 1859 (Bowler 2009). The debates were often a matter of opinion, rather than interpretation of scientific facts, and predominantly concerned with the question of the place of humans in nature.

After 1900 the critical reaction against evolutionary theory took a new turn when fundamentalist Christian groups in the United States put it on a cultural political agenda leading to legal battles over the control of science curricula in state schools (Numbers 1998, 2006, Larson 2007). Because of the geographical origins of creationist fundamentalism, most scholarly attention has been within the United States. The strict separation of state and church made schools an obvious battleground during the twentieth century and into the twenty-first provoking school boards, parents' associations, and other authorities. They insisted that the teaching of evolution in biology classes should either be replaced or supplemented by the teaching of creationism or, from the 1980s, intelligent design. Highly influential and well-funded interest groups have supported creationist claims and generated much attention in a series of highly publicized court cases (Beckwith 2003, Berkman *et al.* 2008).

Museums have also taken part in the controversy with a record of threats and protests directed at museums showing exhibitions on evolution or containing evolutionary content. These include legal challenges to the Smithsonian in 1978 and the Natural History Museum of Milwaukee in 1981 to change exhibitions to present creationist views or to declare the theory of evolution inconsistent. At the Museum of the Earth in Ithaca, New York, the reactions took the form of public protests and harassment of museum employees (Fraser 2006). In 2005 the American Museum of Natural History in New York was unable to secure corporate funding for an exhibition on Darwin and evolution. The failure to do so in this situation was allegedly owing to the controversy between science and creationism. This was a highly unusual situation as normally the American Museum of Natural History is very successful in obtaining corporate funding (Wapshott 2005).

The situation in Europe is different. Overall more people accept the modern theory of evolution when compared to the United States. However, since the early 1990s significant changes have taken place in European countries paving the way for local activism and anti-evolution propaganda; indeed in the twenty-first century creationist groups have been spreading quickly. They do not constitute a uniform movement, they are represented by all major religions, and they have an increasing level of activity. Some European creationist groups are now exceptionally well funded and have gained noticeable political and educational power. The twenty first century has brought numerous reports of how creationist groups and activists have now begun using that power (Coleman & Carlin 2004, Graebisch &

100 Schiermeier 2006, Kutschera 2008, Riexinger 2008, Blancke 2010, Borczyk 2010, Blancke *et al.* 2013, Flipse 2012, Blancke *et al.* 2014, forthcoming). According to the Council of Europe and numerous reports from scientific institutions, science educators and commentators throughout Europe, political and educational action is considered critical (Council of Europe 2007, Kjærgaard 2008, Andersen *et al.* 2011, Blancke *et al.* 2011).

In the wake of 2009 and the international celebration of the 150th anniversary of the publication of the *Origin of Species* and the 200th anniversary of Darwin's birth, European creationists were gaining new ground and used new strategies to promote anti-evolution and anti-science arguments (Kjærgaard 2009a, b, 2010). They successfully appropriated the public forum to promote the argument that accepting the theory of evolution was a matter of opinion and often a matter of choice between one's faith and other people's science.

Creationist groups and anti-evolution views have gained a foothold in Europe over the past couple of decades, but the impact of the increased activism is difficult to measure. What does it mean for public understanding of evolution and acceptance of evolutionary theory? How does it influence public opinion? Data from various polls suggests that people with overt creationist views constitute a relatively small group compared to North America. However, efficient activists in individual countries cloud our understanding of how complex the question of creationism in Europe actually is and who the creationists broadly speaking are. European creationists constitute a rather heterogeneous group with representatives from all major religions including Protestants, Catholics, Muslims, Jews, and Hindus. They come from rural as

well as urban areas, some are small factions with a strong emphasis on literal readings of religious texts, others constitute well-funded large segregations, some are explicitly anti-science, and some appropriate scientific jargon.

For analytical purposes it can be useful to distinguish between imported, local, and intuitive creationism. The first two kinds generally employ an activist agenda. Imported creationism has been brought to Europe mostly by American and Turkish creationists. Local creationism emerges from local religious contexts in practically all European Countries. Intuitive creationism, on the other hand, comprises a set of creationist beliefs that are not explicated, defended or propagated by any particular group and does thus not conform explicitly to matters of cultural, religious, or national identity as the others. It usually takes the form of an intuitive understanding of life on earth and especially humans being created by a god with a natural explanation dismissed as implausible. A recent study and a forthcoming book provide several examples from all over Europe (Blancke *et al.* 2013, Blancke *et al.* 2014, forthcoming).

This latter kind of creationism is harder to trace and contributes to form public opinion implicitly rather than influencing it in the more direct fashion as done by the various activist groups. In that regards it shares similarities with a segment of the European population who are unsure or have not decided whether to accept creation or evolution, or a combination thereof, when it comes to explaining their own origin. Generally, human origins have been identified as the main barrier when it comes to accepting the theory of evolution (Numbers 2007, Gallup 2010, Szerszynski 2010). With any

possible variations on a scale from biblical creation to a result of evolution by natural selection, Europeans are not divided into two distinct groups of either/or. Many will accept evolution for all living plants and animals with the exception of humans, while others are willing to accept a combination of godly creation and evolution. Varying in size in different European countries this segment constitutes a fairly large group of people. Creationist activists are already seeing a lot of potential for gaining support for their cause from this group as documented by a number of recent studies (Kjærgaard 2010, Blancke *et al.* 2013, Blancke *et al.* 2014, forthcoming). Similarly, this group is suitable for a targeted communication to increase public understanding of evolution.

Natural history museums are dedicated to the communication of knowledge and the increase of scientific thinking and understanding. There is no doubt of museums' significance for public understanding of natural history, although the impact they have on society is difficult to measure (Travers *et al.* 2003). One strategy is to look at media coverage of particular events related to evolution. Generally, specific exhibitions tend to get little coverage and mostly in terms of reviews or recommendations for what-to-do with the family during the holidays, and usually such events are difficult to compare across countries. One successful exception is Monique Scott's analysis of human origins exhibitions at four different museums in Kenya, England, and the United States. In a book length analysis she presents her findings from a combination of qualitative and quantitative studies of about 500 museum visitors at the four museums. Her results suggest that the majority of visitors maintain a

linear understanding of human evolution with a built-in teleological perspective, and a bio-cultural journey from bestial African origins to a civilised European present. However, this fairly consistent image of human evolution was rooted in quite different social and cultural contexts (Scott 2007).

The international Darwin celebrations in 2009, however, offered a unique opportunity for cross-national comparisons of events, activities, reactions and reception of evolutionary theory and related questions across the board from anything publicly funded to privately sponsored, institutionally based to individually executed (Secord 2009, Shapin 2010, Kjærgaard 2010). We use here this particular situation to analyse the role natural history museums may have on the public discourse of evolution by comparing the initiatives and looking at the media coverage in Norway, Sweden, and Denmark. The Scandinavian countries offer a framework particularly well suited for such a comparison because of their common history, geographic proximity, and socio-economical and cultural parallels (Sørensen & Stråth 1997).

DIFFERENT APPROACHES TO THE DARWIN ANNIVERSARY IN SCANDINAVIA

During the recent Darwin anniversary in 2009 the National Natural History Museums of Denmark and Sweden and the Natural History Museum in Oslo, Norway chose very different approaches to mark the event. To examine the efforts the three museums in Denmark, Sweden and Norway put into evolution education and outreach that year, information was collected from museums websites, annual reports and personal communications with museum employees on

102 what kind of activities the museums launched during 2009.

In Denmark the Natural History Museum of Denmark in cooperation with Interdisciplinary Evolutionary Studies at the University of Aarhus launched a large educational initiative comprising

- a new 500 m² permanent evolution gallery at the Natural History Museum
- the publishing of a non-fiction book on Charles Darwin and the theory of evolution
- the publishing of a new Danish translation of Charles Darwin's book on the *Origin of Species*
- the launch of an extensive educational website (evolution.dk)
- the launch of new educational programmes for both primary school and secondary school
- a series of public lectures
- an international conference on contemporary evolutionary research

The timing of the different elements in the initiative was spread over most of the year, beginning with launching the website and opening the new evolution gallery in February. It ended with the publication of the new Danish translation of the *Origin of Species* and a major international conference in November (Andersen *et al.* 2011). The museum had a surge of visitors in 2009 with approximately 30 % more visitors than in the previous years. The age demographics also changed. In 2009 the ratio adults/children was 1.48 compared to 1.24 for 2008. For the months of February through April, i.e. the months the exhibition's media presence peaked, the ratio was 1.55 in 2009 compared to 1.22 in 2008. The exhibition and other activities in relation to Darwin and evolution

were consequently successful in attracting visitors who did not previously go to the museum, especially adults. No survey was performed to study what motivated visitors to seek out the exhibition, but random comments from visitors suggest that the understanding of evolution and the relationship it has to our own existence felt relevant to many adult visitors.

In Sweden the main activity at the Swedish Museum of Natural History was a research symposium on evolution featuring the renowned scientist Edward O. Wilson and other scientists. The Swedish Museum of Natural History did not organise any major activities directed to a wider public. The research symposium in Sweden took place in May 2009.

The Natural History Museum in Oslo is not formally a national museum, but as the country's largest natural history museum it fulfils more or less the same role as the national museums in Denmark and Sweden. The Darwin anniversary at The Natural History Museum in Oslo was marked by a 200 m² temporary exhibition, *Can we Forgive Darwin*, and an additional 20 m² exhibition space on *Darwin and Botany* opening in June 2009. The main attraction of the exhibition was a newly described fossil of an early primate, *Darwinius masillae*, nicknamed "Ida" (Tattersall 2009, Fleagle 2010, Kjærgaard 2011).

The initiative in Denmark was aimed at a general public and made an effort to attract a large audience to all its activities. The initiative in Sweden was aimed at a narrow and scholarly audience and advertised accordingly. The initiative in Norway was, like the Danish initiative, aimed at a general public, but was designed as a temporary exhibit and on a smaller scale. The three

different approaches offer a useful platform for comparison on how museums can affect society and public discourse through the media. In Sweden very little was done to take official charge of the Darwin celebrations and the press coverage was left to local initiatives and journalists picking up the story from elsewhere. In Norway and Denmark there were concerted efforts by the museums of influencing the agenda through a series of press releases. The focus was different with the tiny but spectacular fossil *Ida* selling the Darwin exhibition in Norway, while multiple platforms of communication were used in conjunction with the two major universities and the Natural History Museum at the centre in Denmark. The various strategies worked out very differently in the resultant press coverage in the individual Scandinavian countries.

DARWIN IN THE NEWS IN DENMARK, SWEDEN AND NORWAY IN 2009

To compare the publicity of Darwin and evolution in the three countries data was collected from printed media in Denmark, Sweden and Norway. Data from Denmark was extracted from the Danish media database Infomedia. For Sweden and Norway the media database Retriever was used. All nationwide, regional newspapers, local newspapers and news agencies were included in the search. In all three countries the databases cover national newspapers and regional newspapers comprehensively and are nearly complete. The difference in number of hits between the countries consequently reflects a genuine difference in the coverage of Darwin and evolution and is not a result of the different sizes of the databases.

All entries in which the search terms “Darwin” and “Evolution” both occurred in the same article were extracted for all 12 months of 2009. In Danish and Swedish “evolution” is following the English spelling. In Norway the search term “evolusjon” was used. In the analysis of the data all entries from the announcement of television and radio programs were excluded. A few entries that turned out to be irrelevant were also excluded. For example an entry was omitted from a section on cars in a regional Swedish paper making a play of words describing how modern cars had gone through a Darwinian evolution by calling it “Carwinism”.

In Denmark a total of 180 articles appeared in the news in 2009. A little more than half, 97 (53 %), appeared in February, the month of Darwin’s 200th anniversary, making this the highest number of articles published in a single month in any of the Scandinavian countries. The other 11 months averaged 7.5 articles per month. In Sweden the output was considerably lower with only 68 articles for the entire year. The pattern of publication over the year was roughly the same with 26 articles (38 %) appearing in February. For the other months the average in Sweden was 3.8 articles per month. In Norway the search yielded 149 articles about Darwin and evolution in 2009. As in the other two countries the highest count of 42 articles (28 %) appeared in February. The average for the rest of the year was 9.7 articles per month, slightly higher than the Danish average (see Fig. 1). These figures present media coverage filtered by specific frames and thus give a fairly good estimate of the distribution of content and impact on readers. The enormous social and cultural influence of mass communication on public opinion is well

Fig. 1. Newspaper articles on Darwin and evolution in 2009 in the Scandinavian countries.

documented (McCombs 2004). Among the many studies on media and public understanding of science, a few have been done on the topic of evolution. The general conclusions remain stable: the framing and amount of coverage of scientific topics in mass media are instrumental in influencing public opinion (Mooney & Nisbet 2005, Rosenhouse & Branch 2006, Nisbet & Scheufele 2009). A qualitative analysis of the impact of media coverage of evolution in the Scandinavian countries would qualify and deepen our understanding of the communicative interaction and the function of mass media in this context. However, such a study lies beyond the boundaries of the present analysis.

The coverage of Darwin and evolution was done more intensely by some media than

others. All hits from all three countries were sorted to see the distribution of coverage on the different national and regional newspapers. In Denmark 51% of all articles came from five national papers. The newspaper *Kristeligt Dagblad* [The Christian Daily] had the most extensive coverage with a total of almost 17 % of all articles on Darwin and evolution in 2009. In Norway the distribution was somewhat similar with five newspapers responsible for 50 % of the coverage. The newspapers were all national newspapers except for the regional paper *Agderposten* [The Agder Mail] covering districts in southern Norway. The left wing paper *Klassekampen* [The Class War] had the most extensive Norwegian coverage at about 15 % of all articles on Darwin and evolution. In Sweden

Danish newspapers	Norwegian newspapers	Swedish newspapers
Kristeligt Dagblad 31	Klassekampen 23	Dala-Demokraten 7
Weekendavisen 17	Agderposten 14	Sydsvenskan 6
Politiken 16	Aftenposten 13	Eskilstuna Kuriren 5
Jyllandsposten 14	Dagbladet 12	Göteborgsposten 5
Information 13	Morgenbladet 12	Five different papers 3
51%	50%	56%

Fig. 2. The five newspapers with most articles on Darwin and evolution in Denmark, Norway and Sweden in 2009. National newspapers in bold.

the distribution was characterized by more newspapers with fewer articles as well as national newspapers playing a lesser role. With 10 % of all Swedish articles on Darwin and evolution the regional social democratic *Dala-Demokraten* [The Dalecarlia Democrat] had the most extensive coverage.

All entries were carefully read to decide if there was any reference to any of the museum initiatives: exhibitions, reviews, announcements of seminars or lectures, interviews with key staff, or books published. The entries comprised all categories of news including editorials, reviews, letters to the editor, features, columns, and interviews. Calendars with advertisements of local activities were also included.

In Denmark 80 articles (44 %) mentioned one or several of the initiatives of the Natural History Museum of Denmark, reviewed exhibitions or books published by the museum, described the educational evolution website, or featured interviews with staff associated with these activities. In February this tendency was even more pronounced with 59 articles that month (60 %) including activities related to the museum or the website. In Sweden the research symposium as the only official national Darwin event in 2009 organised by The Swedish Museum of Natural History was only mentioned 6 times in newspaper articles. Although there were more articles in Norway than in Sweden, the media coverage of the exhibition at the

Fig. 3. The number of articles in Denmark, Norway, and Sweden mentioning a museum initiative on evolution compared to the total number of articles on Darwin and evolution in the individual countries in 2009.

Natural History Museum in Oslo was low. The exhibition was mentioned explicitly a mere 3 times, while *Darwinius masillae* which was thought of as the museum's new icon and prominently displayed at the exhibition was mentioned 13 times. In 12 of these instances it was without any reference to the museum.

The results are summarized in Fig. 3. The Danish initiatives featured prominently in the news coverage, while the roles dedicated to the Natural History Museums in Oslo and Stockholm were negligible in their respective national media.

DARWIN AND RELIGIOUS ISSUES IN THE NEWSPAPERS IN 2009

The 180 Danish, 68 Swedish and 149 Norwegian articles were examined to ascertain the role religious issues played in the media coverage of Darwin and evolution in 2009.

To decide if an article dealt with or described topics on religion in relation to evolution the following keywords were searched for in the articles: "God", "Creation", "Bible", "Intelligent Design", "Religion", "Christianity", "Christ", and "Church", as well as grammatical

variants of these words like “God’s”, “Creationist”, “Religious”, etc. The Danish search terms were “Gud”, “Skabelse”, “Skabelsesberetning”, “Bibel”, “Kreationisme”, “Intelligent Design”, “Religion”, “Kristendom”, and “Kirke”. The Swedish search terms were “Gud”, “Skapar”, “Skapelse”, “Bibeln”, “Kreationisme”, “Intelligent Design”, “Religiös”, “Kristendom”, and “Kyrka”. The Norwegian search terms were “Gud”, “Skaper”, “Skapelse”, “Bible”, “Kreasjonisme”, “Intelligent Design”, “Religion”, “Kristendom”, and “Kirke” (and “Kyrkje” in Nynorsk). If one or more of any of these words were found in an article, the article was coded as an article about religion.

This of course did not rule out that the articles were also about other issues, which was often the case. Many articles dealt with various different topics, for example Darwin’s life, the principles of evolution, or human origins. No attempts were made to decide to what degree an article dealt with religious topics, or to decide if an article was objectively describing the phenomenon or supporting one view or another. In all three countries religious issues were part of the articles in many different ways, including neutral matter-of-fact descriptions (Darwin’s theory of evolution conflicting with religious views), in-depths analyses of the controversies involving creationism and intelligent design in teaching in American and European schools, and strongly worded articles either for or against creationism or evolution.

In Sweden 77 % of the articles (53) were either about religious issues or at least included religious themes in text. In Denmark the percentage of articles with religious content was lower than in Sweden with 67% of the articles (120) containing words referring to religious issues. The lowest

percentage of articles with religious content was seen in Norway, where 62 % of the articles (93) had words with religious meaning.

The articles were divided into five categories: news (this category comprised all types of news, including features and background articles), commentaries (including columns and editorials), announcements (announcements of events, lectures, exhibitions etc.), reviews (of books and exhibitions), and letters to the editor.

News constituted the biggest category in Sweden with 62 % and in Denmark with 51 %. In Norway news constituted 33 % of the articles. The biggest category in Norway was commentary at 34 %. Reviews and letters to the editor both constituted less than 10 % in all three countries, except for Norway where the category letters to the editor counted 15% (see Fig. 4).

The highest content of religious issues was found in Sweden in the categories commentary, reviews, and letters to the editor in which all articles contained words referring to religion. In Norway the category letters to the editor was also very high with 91 % of these coded for religious issues. The category commentary with religious content was also high for Denmark (81 %) and Norway (66%). Announcements was the category with least articles with a religious content. @Brødtext NM indrag: Understanding the theory of evolution in a religious context has a history in the Scandinavian countries going back to the 1860s. It has not, however, been a dominant factor in discussing evolution until recently (Kjærgaard & Gregersen 2006, Kjærgaard, Gregersen & Hjermitsev 2008, Lie 1985, 2008, Gregersen & Kjærgaard 2009, Hjermitsev and Kjærgaard 2014, forthcoming). With religion as a dominant

Fig. 4. Distribution of articles on Darwin and evolution organised by category

contemporary frame the Scandinavian media follow a more general journalistic tendency of seeking and often thereby constructing controversial topics or opposing sides. This tendency proliferates with science topics dealt more and more by news journalists, political correspondents, and cultural reporters, rather than science journalists (Nisbet & Scheufele 2009).

DISCUSSION

What is the value of a museum in a community and how can a natural history museum be relevant to its audience? Answering such questions is notoriously difficult. Natural history museums reflect huge investments, as a combination of public and private funding, and use of expertise, skills, training, time, and other resources. It

matters and is crucial for the success and budgets of most natural history museums to be able to attract large numbers of visitors. This is also often what is used to determine whether or not special exhibits or new developments manage to meet their end. From that perspective the permanent exhibit “Evolution” at the Natural History Museum of Denmark in Copenhagen and the temporary exhibit *Can we Forgive Darwin?* at the Natural History Museum in Oslo were quite successful as both had a surge in visitors following the openings in February and June 2009 respectively. In both countries this success was a result of considerable investments, including prior fundraising, but was also a consequence of concerted efforts including more than merely building new exhibits.

Determining the cultural assets of natural history museums is far more complex than

Fig. 5. The distribution of newspaper articles measuring religious content within each category for each of the Scandinavian countries in 2009.

looking at numbers in terms of budgets and visitor statistics alone. One way of measuring a broader societal relevance is to see how well their activities are reflected in the media and in public discourse. In both the Danish and the Norwegian cases there was something additional to the exhibits themselves to boost public interest. The strategies chosen by the two museums differed and were contingent on initiatives in and collaboration with the evolution research communities in both countries.

In Norway the interest was boosted by a particular Eocene primate, *Darwinius masillae*, that became world famous almost overnight as Google used it as their themed logo on the 20th of May 2009, following a well-staged press event at the American Museum of Natural History. Notables such as David Attenborough and the mayor of New York City, Michael Bloomberg, were part of the campaign competently orchestrated by the

Norwegian palaeontologist, Jørn Hurum from the Natural History Museum in Oslo, to promote the tiny fossil. The fossil was quickly known by its nickname Ida as well as the image of its furry outline on a glowing resin base. The fossil was bought by the Museum of Natural History in Oslo and its scientific investigation led by Hurum. It had been a particular aim to construct an icon for the museum by which it would be known and recognised around the world. The governing board of the museum decided to follow the plan, even though it would be a serious financial venture. Ida had not been part of the original strategy for the exhibit, but as it happened it made sense to include the fossil. Despite criticism about procuring expensive fossils from business-minded collectors, the investment paid off with Ida being the main attraction at the exhibit opening in Darwin's name (Kjærgaard 2011, 2012).

The Danish exhibit at the Natural History

110 Museum in Copenhagen was made in collaboration with an interdisciplinary research group using the Darwin celebrations to communicate evolution to a broader public. From the outset the exhibit was thought to be part of a national campaign involving the two largest Danish universities to increase knowledge about Darwin and evolution to the public. A specific aim was to educate school children and provide a knowledge base for anyone interested in evolution, including journalists. Central to this was a myth busting strategy confronting common misunderstandings about Darwin and evolution. This proved to be one of the most successful tools generating interest and broadening the understanding of evolutionary theory and the significance of science to answer fundamental questions of life on earth. From the very beginning the myth busting entries on the online encyclopaedia were among the most popular and have continued to be so. Following an online collection of Darwin and evolution myths these have been included in the general media coverage of Darwin and evolution, and appear in numerous websites, often quoted verbatim and without reference to the online encyclopaedia. The very choice of words—and sometimes with entirely identical paragraphs—demonstrates the effect this strategy has had. None of these issues were part of the media coverage or the public debate in Denmark prior to the launch of the myth busting strategy as an educational and communicative tool (Andersen *et al.* 2011).

The focused effort in Norway and Denmark was especially effective in generating media coverage in Denmark and slightly less so in Norway. Compared to Sweden the numbers of news articles about Darwin and evolution were higher in Denmark and Norway, but only in

Denmark do the high numbers of articles seem to be related to the museum initiative. Breaking down the numbers, however, reveals telling differences between the two countries. The Natural History Museum in Oslo chose to address evolution as a controversial topic and challenged the audience with the question of whether or not we would be able to forgive Darwin for introducing his theory. Introducing the idea of forgiveness also played into a Christian ethos immediately placing science in a non-scientific and broader religious context. The design of the concerted effort in Denmark that included the exhibit at the Natural History Museum in Copenhagen, the educational programmes and the educational website evolution.dk was decidedly scientific. However, the agenda was transparent anti-creationist and stripped of anything justifying religious contexts as a primary concern.

The difference was also clearly reflected in the media coverage with a decidedly partisan coverage in Norway including more opinion pieces and letters to the editor, while distinctly less so in Denmark and Sweden. Seen in combination with a higher percentage of articles coding for religious issues in Denmark and Sweden this confirms the interest in the media and among professional journalists to seek simple antagonistic narratives with the expectations to find a conflict of science and religion.

It is not possible to say on the basis of data from the media coverage whether or not there was a causal effect between an exhibition inviting to share opinion rather than advancing scientific knowledge, and a more personal media coverage, or if the exhibition strategy responded generally to evolution as a controversial issue in Norway. However, it is evident that the use of multiple platforms

worked as a successful strategy to communicate evolution broadly in the Danish public and to a certain extent qualify the media coverage and increasing the public understanding of evolution, despite a strong interest in the question of science and religion. Although Scandinavian creationists seized 2009 as an opportunity to promote their cause, they had little success setting the agenda in the media. Religious issues were important, but they were mostly filtered through professional journalists and not defined by creationist activists who were using other sources to communicate their messages locally, mostly in pamphlets, websites, and lectures (Hjermitslev & Kjærgaard 2014, forthcoming). Creationism was part of the public discourse as a reflection of journalists' interests rather than a result of fundamentalist action. In that regard the Danish anti-creationist initiatives were successful by dominating the media coverage through the museum, the educational website and related activities.

Regardless of the differences, the considerable media coverage in Norway and Denmark corresponds to the efforts and investments in both countries using the Darwin anniversary year actively to communicate natural history. In contrast, the scattered small-scale activities in Sweden matched the significantly lower general media coverage. Although it is difficult to conclude definitively on the basis of this particular case that there is a causal connection, the comparative basis including the cultural, social, political, scientific, and religious similarities between the Scandinavian countries, makes a convincing case suggesting a strong correlation between the scale and ambitions of museum strategies and public discourse. Concluding from our findings a focused effort

using multiple platforms is more likely to have an impact and direct influence on public debates. Engaging a non-controversial narrative to a potentially controversial topic like evolution may increase the likelihood of busting myths and challenging popular misconceptions. On the other hand, a strategy supporting or engaging a controversy narrative increases the likelihood of enforcing a popular image of controversy and locking already established and antagonistic positions in public discourse.

We have personally had encounters with anti-evolutionists in various forms. For example talks about Darwin and evolution have generated strong reactions from representatives of some of the major religions. The reactions have included high school students reading aloud from the Bible during a lecture as well as aggressive confrontations and accusations of presenting a "limited perspective" on evolution. The view presented in these situations is usually that science just presents one side of the story, and the other, divine creation, is not offered as an alternative explanation. This way of arguing is the same as seen in the debate in the United States, especially in the controversy over teaching evolution in schools. It is also often seen in creation-based web-pages on evolution, and it is not unlikely that students pick up arguments by reading these sites. Such strong reactions as described above are rare, however, and the issue is usually considered relatively uncontroversial by most participants in museum related events. The levels of acceptance of the theory of evolution in Scandinavia is generally among the highest worldwide (Miller *et al.* 2006). It was therefore somewhat surprising that the Scandinavian media attention on Darwin and

112 evolution was so focused on the religious aspects and ramifications of evolution. As noted above we suggest that part of the reason for this is to be found in the journalists' desire to find antagonistic narratives. Indeed this was confirmed by our personal experience in a number of encounters with journalists looking for an angle on evolution, an interesting hook, or simply a good narrative. However, the high percentage of religious content in the articles correlate with findings pointing to human origins as the main barrier for accepting evolutionary theory. This reflects that evolution is deeply connected to existential questions like where we come from, our relationship with other organisms, and the purpose of life. It does not get any more existential than this. These are issues and questions that make science and natural history relevant to the public on a very personal level, and it may help explaining why the exhibition in Copenhagen was able to attract not only a bigger audience, but also new categories of visitors, especially an increasing number of adults.

At the 21st Century Learning in Natural History Settings Conference at the Smithsonian Institution in 2012 a growing concern that natural history museums were at a tipping point was expressed. If the museums are unable to change and evolve there is a real risk that they will become irrelevant to the public and consequently cease to exist. The public awareness and understanding of critical questions about the earth and life on it are increasingly important at a time when threats and risks to life on earth are linked intimately to our scientific understanding of the processes involved (Steiner & Crowley 2013).

Facing the challenge of making museums relevant to the public is crucial to natural

history museums. The public reception of museum initiatives in Denmark and Norway as well as the strong impact in the media especially in Denmark points to evolution as a topic perfectly suited to engage the public by making the questions in the exhibits relevant to people's lives, drawing people in by taking them seriously, and providing them with scientific answers. There is a great potential in a public perception of evolution as a controversial topic. There is every reason to take that seriously without involving anti-evolution arguments. Evolution is about all life on earth and how everything is related. It is the scientific story about ourselves and everybody else. It is deep and fascinating. It begs questions to which Natural history museums can provide many of the answers. Topics that are considered controversial by journalists, activists, or ordinary members of the public have the potential to provide a platform for communication and an opportunity to make an impact beyond the walls of museum itself. This should be the ambition of any natural history museum.

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