ARTICLE

A Place for Kids? The Public Image of Natural History Museums

HANNE STRAGER AND JENS ASTRUP

Abstract Scholars, commentaries, guide books, and people "on the street" seem to agree and take for granted that natural history museums are mainly aimed at children. Nevertheless, no studies have specifically investigated the public image of natural history museums. In this study, we provide quantitative evidence that natural history museums are indeed seen by the public as being primarily aimed at children and families with children, and we discuss the consequences that this fact has for the potential role that natural history museums could have in promoting science literacy and for the perception of science in general.

In their mission statements, natural history museums typically declare an ambition to be for everybody—for children, young adults, and adults. But in visitor surveys, blog posts, guide books, as well as in our own personal communications with people from many walks of life, the perception seems to be that natural history museums are mostly for children. In blog posts and internet sites evaluating visitor and tourist destinations, it is not uncommon to see comments like these: "If you hate being around hordes of screaming kids, avoid the Natural History Museum at all costs"—said of the Smithsonian National Museum of Natural History, in the internet travelguide World66. Or: "If my kids were younger, it might have held more interest"—said of the Natural History Museum, London, in the internet guide Yelp. Another common response when we tell people where we work is "Nice museum—I used to come there a lot when my kids were small."

The view that natural history museums have become places primarily for children is also expressed in popular books. In her international bestseller, *The Canon*, Natalie Angier notes how natural history museums and science centers have become places for children: "The differential acoustics tell the story. Zoos and museums of science and natural history are loud and bouncy and notably enriched with the upper registers of the audio scale. . . . Science appreciation is for the young, the restless, the Ritalined" (Angier 2007).

It would seem that museums with ambitions to be for everybody, both children and adults, are not in concordance with the perceptions of natural history museums shared by the general public. However, the topic has caught little scholarly attention, and no quantitative surveys or studies have been published. Most researchers simply observe the phenomenon described above as a well known fact. In his interesting book *Do Museums Still Need Objects?* American historian Steven Conn dedicates the chapter "Where Have the Grown-ups Gone?" to the issue of natural history museums being aimed primarily at children. He describes the transformation undergone in natural history

Hanne Strager (hanne@snm.ku.dk) is head of exhibitions and Jens Astrup (jastrup@snm.ku.dk) is exhibition developer, National History Museum of Denmark, University of Copenhagen, Gothersgade 130, 1323 København K, Denmark.

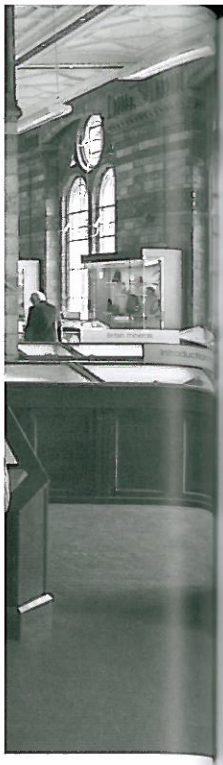
Photo 1. The Natural History Museum, London. *All photos in this article are by Jens Astrup.*

museums, which—from the beginning or middle of the twentieth century—gradually turned their attention toward children, but his focus is on the reasons behind the transformation; he considers the transformation itself to be a fact (Conn 2010).

Likewise in a paper on the communication between children and grandparents at museums, Sanford, Knutson, and Crowley call the museums child-centric and write: "It is rare to find a new science exhibition these days that does not have families with children as the primary audience" (2007). Henriksen and Frøyland also describe the public image of natural history museums as associated with childhood, children, and education of children (2000). However, their conclusion emerges through interviews with a focus group and museum professionals about the possible role museums could play in educating the public about dangerous radon gases; the presence of children was not the focus of the study.

If the observations and remarks above are a valid representation of the public image of natural history museums, there may be serious implications for both visitors' and potential visitors' expectations when deciding to visit a natural history museum versus doing something else. Knowing the public image of natural history museums is of course important to understanding an existing audience's expectations. It is also central to understanding non-visitors' expectations and preconceptions, especially if the museum wants to reach a broader audience. Knowing a museum's public image is also crucial to understanding what role the museum plays in the society.

In February 2012, the Smithsonian Institution hosted the Twenty-first Century Learning in Natural History Settings Conference and invited participants from all major natural history museums in the U.S., Canada, and the U.K. There was a general agreement at the conference that natural history museums have the opportunity to play a pivotal role in adressing critical challenges like climate change and the biodiversity crisis and in commmunicating these concerns to a wide audience. But according to the conference participants, most natural history museums are missing this opportunity



(Steiner and Crowley 2013; Watson and Werb 2013). In fact, Steiner and Crowley express the concern that if natural history museums are unable to change and evolve, there is a real risk that they will become irrelevant and cease to exist (2013).

THE STUDY

The aim of the present study is to investigate the public image of natural history museums and to discuss the possible consequences for natural history museums' role in society. Telephone interviews were conducted by experienced interviewers using Computer Assisted Telephone Interviewing (CATI) at DMA/ Research, a Danish market research company. Respondents were chosen by random selection of phone numbers from all of Denmark, in both urban and rural areas. Altogether, 605 interviews were completed during two days in 2012. All respondents were age 18 or more. (See Appendix A for the full text of the interview questions.)

Findings

A total of 534 persons rated the extent to which they felt that natural history museums are primarily aimed at children (Q3; figure 1a); 71 persons chose the don't-know option. For art museums (Q6; figure 1b), the corresponding figures were 581 and 24, respectively. The distribution of ratings for the two museum categories is shown overall in figure 1. The difference between the means is highly significant ($p < 0.000$; Paired Samples T-Test).

The respondents who answered that they felt natural history museums had a strong focus on children (4 or 5 on the scale) were asked if this feeling made them visit this kind of museum more or less often. Only a minority replied that their assesment of the museum as having a child focus makes them visit less often (figure 2). However, there is a tendency for respondents under 29 years (age 18–29 years) to visit natural history museums less often because of the perceived child focus. The difference is statistically significant (Pearson Chi-Square Test and Comparison of Column Proportions), but only at the 0.05 level, so another study will be required to establish this tendency more securely.

A total of 587 respondents rated to what extent they felt that natural history museums expect their visitors to learn during their visit (Q5; figure 3a). For art museums (Q8; figure 3b) and science centers (Q9; figure 3c), the

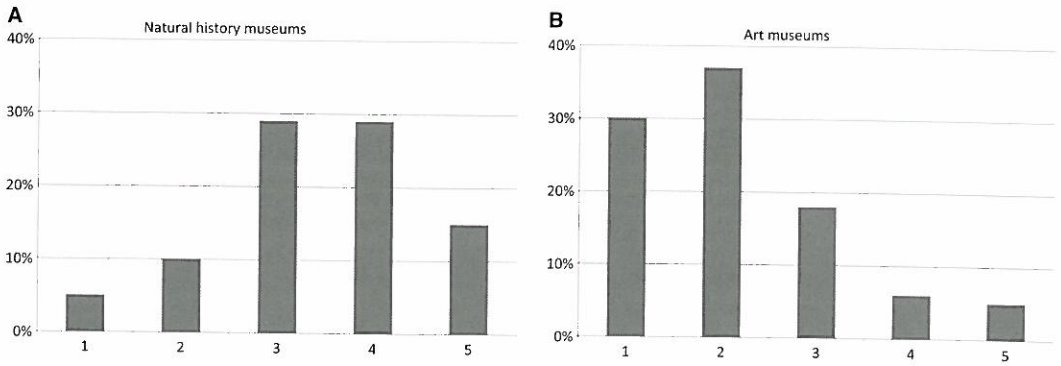


Figure 1. Comparing natural history museums (a) with art museums (b).

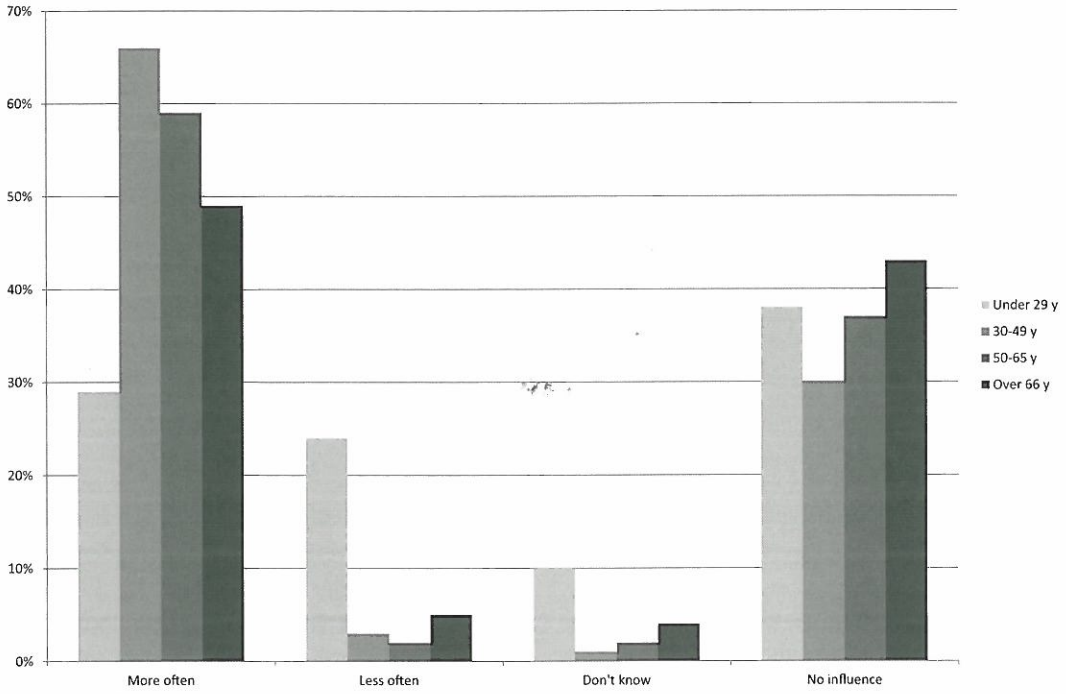


Figure 2. Visits to natural history museums in relation to child focus.

figures were 574 and 554, respectively. The distribution of ratings is shown overall in figure 3.

Compared to art museums, a much higher percentage of respondents felt that natural history museums expect their visitors to learn during their visit. The difference is highly significant ($p < 0.000$; Paired Samples T-Test). In fact, the distribution of answers for natural history museums resembles the distribution for science centers, although for science centers, the learning expectation is even higher.

In this study, the interviewers attached no positive or negative value to the question about learning expectations; nor was a definition given. This may mean that respondents' anwers to the question span a variety of perceptions and ideas about learning—positive and negative. Nevertheless, the learning expectation associated with natural history museums is much higher than the one associated with art museums.

While the resemblance of the distribution of answers for natural history museums and science centers and their pronounced difference to art museums might indicate that the respondents' image of natural history museums as being aimed primarily at children is tightly associated with the respondents' assessment of the learning expectations associated with different types of museums, further analysis of the data showed that this is likely not the only factor. Respondents who rated natural history museums' child focus as low or medium (ratings 1 to 3) in Q3 gave an average rating of 4.23 for the museums' expectations for their visitors to learn, whereas respondents rating the child focus of natural history museums as high (4 or 5) gave an average rating of 4.42 for the learning expectation. The small difference strongly suggests that other factors are at play also.

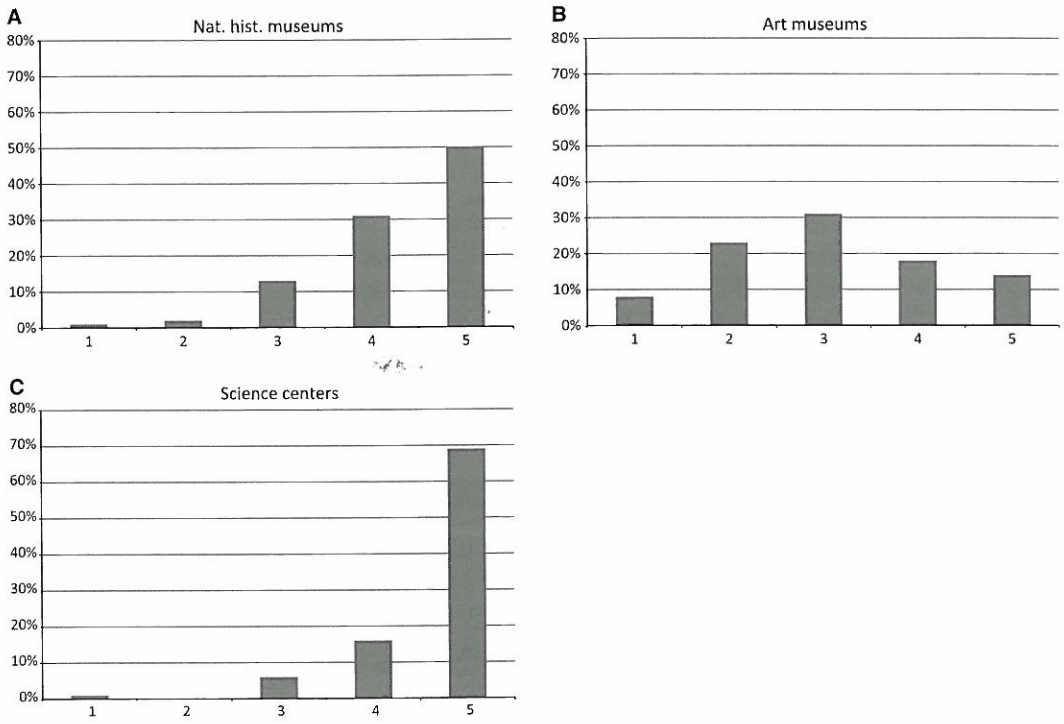


Figure 3. Learning expectations in visits to natural history museums (a), art museums (b), science centers (c).

Additional information about respondents

The age distribution of the 605 respondents is shown in figure 4. Seventy-three percent were parents or grandparents, and 53 percent were women. Educational attainment levels in our sample are somewhat higher than the average distribution of education attainment levels in Denmark (source: Statistics Denmark, http://www.dst.dk). As expected, there were differences in answers to the general questions, such as how often respondents visit museums, but for Q3, Q5, Q6, Q8, and Q9, there was little variation between respondents with different education attainment levels. Only for answers to Q5 (learning expectancy at natural history museums) and Q9 (at science centers), respondents with higher education seemed to rate the learning expectancy slightly higher.

Identifying natural history museums can be problematic

A total of 453 respondents stated that they had visited a natural history museum (Q11). Of these, 41 gave examples of museums which did not include natural history museums, although

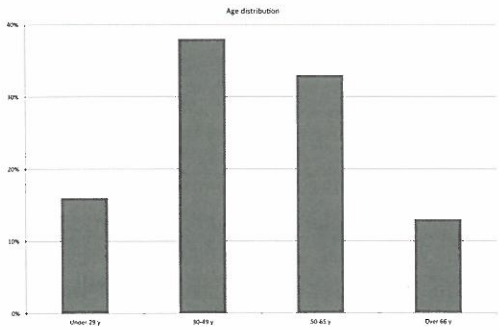


Figure 4. Age distribution of respondents.

Photo 2. Children play with bones in the Natural History Museum of Denmark in Copenhagen.

in Q2, 22 of the stated associations clearly were to natural history museums. Thus, for 19 of the 41 respondents, it is doubtful whether their answers related to natural history museums. Another 64 of the 453 respondents couldn't remember which natural history museum they had visited and thus did not give any examples. Of these 64 respondents, 21 gave associations in Q2 which clearly were to natural history museums, 14 gave associations which neither confirmed nor disproved that they knew what a natural history museum is, and 29 gave associations which clearly were not to natural history museums.

A total of 152 respondents stated that they had never visited a natural history museum. Of these, 36 gave associations in Q2 which clearly related to natural history museums, 104 gave associations which neither confirmed nor disproved that they knew what a natural history museum is, and 12 gave associations which clearly were not to natural history museums. In summary, this means that answers from a total of 60 (19 + 29 + 12) respondents (out of 605) probably did not relate to natural history museums, but rather to cultural history museums, mostly. Looking at the answers from a total of 118 (14 + 104) respondents (out of 605), it could neither be confirmed nor disproved that they had an accurate picture of what a natural history museum is.

Not surprisingly, by far the largest contributors to these two groups were respondents who stated that they had never visited a natural history museum. The vague conception of what a natural history museum is for these respondents may have influenced their answers. We find it a reasonable assumption that, if anything, this will have weakened the trends shown in the data, since the answers from these respondents

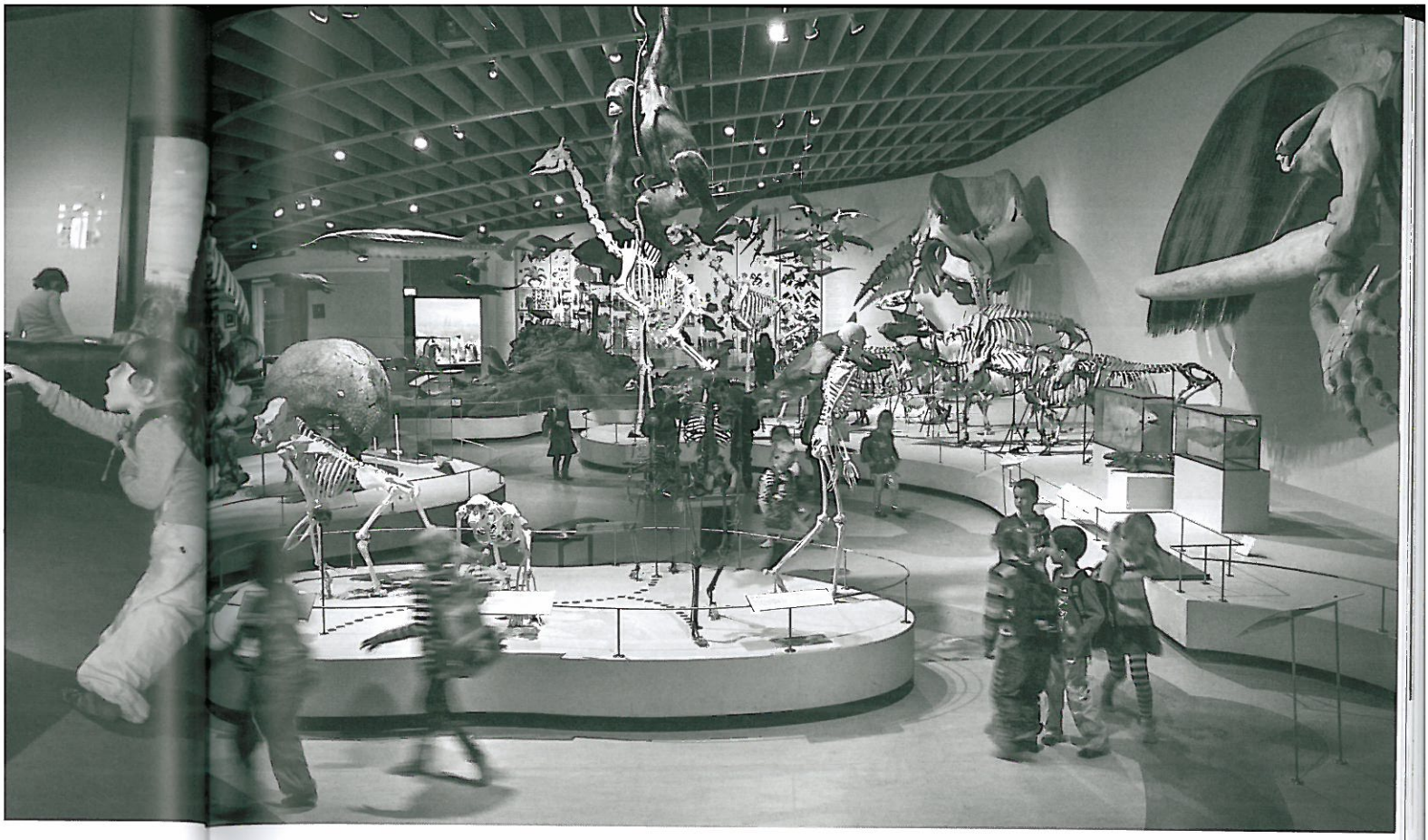


Photo 3. In the Evolution exhibition of the Natural History Museum of Denmark.

would either reflect that they only rarely visit museums or that their answer pertained to a cultural history museum. While cultural history museums were not part of this study, we find it a reasonable assumption that they are not perceived as more child focused than natural history museums.

DISCUSSION

This study documents that the perception expressed by laymen, science writers, and researchers is an accurate reflection: In people's minds, natural history museums have become museums for children, and their public image in this respect differs radically from that of art museums. Possibly related to the image of natural history museums as "children's museums" is the opinion expressed by more than 80 percent of the respondents that the purpose of a natural history museum as well as a science center is to be educational, although other factors are likely at play also. The survey was performed by a company with extensive experience in addressing issues and topics in the general public, and covered more than 600 respondents picked randomly via phone numbers for the interview. Since the survey included both visitors and nonvisitors, it gives a good representation of what people actually think of the museums covered by the survey, and whether this makes the museums attractive or not to those interviewed.

The study is limited to Danish respondents and could therefore reflect a separate view held by Danes. However, there is no evidence to suggest that Denmark should constitute a special case when it comes to natural history museums and the perception of them. Natural history

museums in Denmark are rooted in the same history and traditions as museums in the rest of Europe and in the U.S., and share many common features (Yanni 2005; Asma 2001; Findlen 1994; Bedini 1965). To investigate the question further, we compared answers from the 71 respondents who had included one or more natural history museums outside Denmark (mainly European and U.S. museums) as examples of natural history museums visited, versus the 391 respondents who only gave examples of Danish natural history museums. The distribution of their answers to Q3 differed markedly; the group who had visited natural history museums outside Denmark showed a more even distribution of ratings. It is worth noting that the sample size was small and that there was a heavy bias toward higher education attainment levels in the group who had visited natural history museums outside Denmark; this group is therefore not a representative sample of a general population.

An unpublished study on the public image of natural history museums and science centers, by Susie Wilkening, senior consultant and curator of Museum Audiences with Reach Advisors (pers.com), shows similar results as ours. She found that 79 percent of the visitors felt that children and their families are the best served audience at a natural history museum (81 percent for science centers). Additionally, 62 percent of respondents felt that students visiting with their class were best served (59 percent for science centers). Only 25 percent of respondents felt adults were best served, and just 14 percent said likewise for teens (22 percent and 17 percent respectively for science centers).

Given the similarity of natural history museums in Europe and the U.S., and the study by Susie Wilkenings, we think there is good reason to believe that the conclusions of this survey have relevance to other Western countries, but it certainly would be interesting to see this kind of study repeated in other European countries and the U.S.

WHO VISITS NATURAL HISTORY MUSEUMS?

Although there are no previous studies assessing the public image of natural history museums, observations and surveys on visitor profiles show that families and children do indeed constitute a larger percentage of visitors at natural history museums than at other types of museums. At the Smithsonian Institution, a study of visitor profiles concludes that roughly half the visitors arrive at the National Museum of Natural History in groups including adults and children. The study, however, did not include school groups. This result confirms earlier studies where Doering and Bickford (1997) found that visitors at the National Museum of Natural History are more likely to come in a group that includes both children and adults (42 percent compared to 36 percent for all Smithsonian museums), and Bielick et al. (1995) who concluded, based on visitor surveys, that the National Museum of Natural History was a family museum. The last two studies also did not include school groups. Since school groups generate a large proportion of the visitors in most, if not all, natural history museums, leaving them out of a study probably gives a skewed picture of the profiles of visitors, seriously underestimating the percentage of children in the museum and their contribution to the general atmosphere experienced by visitors at the museum.

As part of a large-scale questionnaire survey, the National Heritage Agency of Denmark mapped, *inter alia*, visitor-age profiles at all national and government-approved Danish

Photo 4. In the Museum für Naturkunde, Berlin.

museums in 2009, 2010, and 2011. A marked difference emerged between natural history museums and—in particular—art museums. On average, visitors at a natural history museum were found to be younger than visitors at other museums. (In Andersen, Jensen, and Lundgaard, the report from 2011, 41 percent of the visitors at natural history museums were older than 50 years, compared to 66 percent for art museums; figures for 2009 and 2010 are comparable.) In the report from 2011, 77 percent of visitors visited the museum in a group, compared to 48 percent for art museums; figures for 2009 and 2010 are comparable (Moos and Lundgaard 2009; 2010). Since visitors younger than 14 years were excluded in the studies, the reports do not give an accurate picture of visitor age-profiles. In Germany, in a study encompassing about 17,000 visitors and non-visitors, the author concludes that the most frequent adult visitors to a natural history museum are between 30 and 45 years and come from a household with 2-3 children (Kirchberg 1996).

Linton and Young found visitors to art museums to be older and to visit in smaller groups with fewer children, compared to visitors to cultural history and natural history museums, science centers, and zoos (1992). For the latter three groups, the tendency to have younger visitors in larger groups with more children was most pronounced for zoos, followed by science centers.

In Australia, Rennie and Williams found a big difference in visitor profiles between a science center and a museum (2006). (The museum included natural history but also cultural history.) At the museum, only about 25 percent of the visitors were accompanied by children, whereas at the science center most visitors came with children (the actual percentage is not shown). These findings correlate with

those that Korn (1995) has observed in U.S. museums and science centers.

The apparent difference between visitor profiles at natural history museums in different parts of the world could be explained by the different nature of natural history museums in different places. Some museums, like the museum in the Australian study, include natural history but also cover ethnography and cultural history. Those museums may have a less family oriented audience than the "pure" natural history museums.

Although these surveys and studies of visitor profiles confirm that natural history museums are visited more by families with children than other museums (but not science centers), they don't tell us why. Are natural history museums just good at attracting families with children without sacrificing their appeal to adults, or do they hold an image in people's minds of being mainly aimed at children? Our results point to the latter explanation.

THE LINK BETWEEN BEING EDUCATIONAL AND BEING FOR CHILDREN

As Conn points out in his chapter "Where Have the Grown-ups Gone?" the educational content of natural history museums is somehow connected to the disappearance of the adults from those museums (2010). At the same time, the opportunity to learn and discover new things is certainly an important part of the attraction of natural history museums for adults, although it is not always clear whether it is for their own sake or for the sake of children that adults feel that the educational part of a museum visit is important.

Science centers and museums of natural history are different in their history, concept, and scope, but they also share similarities—most importantly, they are both about science. We suspect that some of the ingredients giving natural history museums a public image as a place primarily for children are the same as those that are at work in science centers. While our data suggest that other factors than learning connotations are at play, this study was not designed to investigate which aspects of natural history museums make them attractive to children and their parents. But the strong expectation that natural history museums as well as science centers will be educational may be a clue and deserves further examination.

MUSEUMS AND SCIENCE LITERACY

Scientific understanding and awareness of scientific phenomena and processes are important for active participation in society, when making both personal and political choices. The basics for understanding science are learned in school, but a large part of what people know about science is likely learned outside the schools, from television, books, magazines, the internet, as well as from museums and other informal learning places (Falk and Dierking 2010). For many natural history museums, it is a goal to play a central role in science learning and in creating science literacy, for both children and adults. Natural history museums can contribute to the increase of science literacy through the dissemination of knowledge and information, by invoking wonder and admiration, and by creating dialogue and discussion with the audience (Valdecasas and Correas 2010). Science literacy in adults in the U.S. has increased significantly over the last two decades. But Miller (2010) argues that the frequency of museum use doesn't contribute significantly to civic science literacy; he suggests that the increase is due to other factors, especially educational attainment. He predicts that this suggestion may be controversial to many in the

informal science education community. He writes: "But others will see this result as a wake-up call for informal science educators to recognize the potential of their institutions in the emerging adult learning environment and the need to become more competitive in that market" (Miller 2010).

The importance of museums as informational resources is also questioned by Kisiel (2004). In a study about the role of natural history museums, visitors at the Natural History Museum of Los Angeles County were asked where they would turn for more information or news on science or nature. Only 18 percent reported they would seek information at a museum, whereas 81 percent said they would turn to the internet.

In a large survey at the National Museum of Natural History, Smithsonian Institution, 78 percent of visitors reported education as the purpose of their visit (Bielick et al. 1995). Pekarik, Doering, and Karns (1999) found that the cognitive experience was the second most important factor to visitors at the National Museum of Natural History—the experience of the object being the most valued.

Hood (1983) found that, for frequent museum visitors, the opportunity to learn is rated as one of three important reasons to go to museums. Interestingly, she also found that for occasional and non-visitors, the prospect of a learning experience is exacting and ponderous and deters them from visiting museums.

In a study of visitors and non-visitors in Taiwan, Lin (2006) observed similar trends. He argues that the association of museums with learning and education is likely to be the major barrier for non-visitors to museums. He also found that women with children, athough not interested in the educational experience themselves, are willing to visit museums for the sake of their children.

In a study of scientific literacy and museums in Norway, Henriksen and Frøyland (2000) investigated how parents of children in a school with high radon levels sought information. They also interviewed museum professionals from a natural history museum and a technology museum. They conclude that neither the parents nor the museum professionals see museums as relevant to information on the radon problem. From the interviews with the parents, it was also apparent that the parents saw natural history and science museums as being so associated with childhood that it didn't occur to them to go there for their own purposes. The authors observed, "If widespread, such a perception would pose a problem for the use of museums to promote civic and practical scientific literacy for *adults*."

Our study shows that their concern is warranted. The attitude that natural history museums are primarily for children is indeed widespread, and the potential that museums have for disseminating knowledge and understanding of issues concerning nature and science is most likely impaired by having a public image as "museums for kids."

YOUNG ADULTS AND MUSEUMS

Attracting young people to museums is easier said than done. Despite the fact that they constitute about 23 percent of the population in Denmark, young adults (defined as being between 15-25 years) constitute only 12-13 percent of the visitors at museums (Moos and Lundgaard 2010). It is worth paying attention to the tendency in our data for young people (in this study, people 18-29 years) to state that they are less likely to visit natural history museums because they perceive them as "children's museums." If this can be established with more certainty, it is a cause for concern, especially if it

also holds true for even younger people (teenagers), which would likely be the case. It is widely agreed that attracting young people to science and stimulating them to seek a career in that direction is important in most Western countries, yet many studies show that young people's interest in science is waning (Sjøberg and Schreiner 2010; Osborne and Dillon 2008; European Commission 2004). Informal learning centers like museums may have an advantage in generating interest and learning; the mere fact that museums are "not school" is what makes them attractive to many (Dierking 2007; Falk and Dierking 2010), but this effect may be offset if young people see natural history museums as primarily aimed at children.

CONCLUSION

When natural history museums, as our data show, are seen as places mainly for children, then there is a risk that topics and themes covered by these museums are not perceived as relevant to an adult audience. Science—whether it is climate change, the biodiversity crisis, diseases and health, or resource management—is obviously hugely relevant also to an adult audience. By having an image as children's museums, natural history museums risk jeopardizing their potential role in interpreting science to adults and engaging them in a dialogue on scientific questions and controversies, and are thus potentially in conflict with the desire to play a role in generating a civic and practical understanding of science.

It is often argued that the most important goal for natural history museums is to generate an interest for nature and science in children and young people; indeed this may very well be the reason that natural history museums have increasingly been aimed at children. Our data show that there is a tendency for teenagers to not want to come to natural history museums, precisely because they see them as having an image as being for children. This is certainly a topic that deserves more scrutiny. If the child-friendly image of natural history museums and science centers comes to be associated with science itself, then there is a risk that young people come to see science as something that is childish and that you outgrow as you mature. **END**

REFERENCES

Andersen, J. B, J. T Jensen, and I. B Lundgaard. 2011. *The National User Survey 2011*: Danish Agency of Culture.

Angier, N. 2007. *The Canon: A Whirligig Tour of the Beautiful Basics of Science*. New York: Mariner Books, Houghton Mifflin.

Asma, S. T. 2001. *Stuffed Animals and Pickled Heads: The Culture and Evolution of Natural History Museums*. New York: Oxford University Press.

Bedini, Silvio A. 1965. The evolution of science museums. *Technology and Culture* 6(1): 1–29.

Bielick, Stacey, Andrew J. Pekarik, Zahava D. Doering, Elizabeth K. Ziebarth, Steven J. Smith, and Adam Bickford. 1995. *Beyond the Elephant: A Report Based on the 1994–1995 National Museum of Natural History Visitor Survey*. Washington, DC: Smithsonian Institution. Institutional Studies Office. National Museum of Natural History.

Conn, S. 2010. *Do Museums Still Need Objects?*. Philadelphia: University of Pennsylvania Press.

Dierking, L.D. 2007. *Linking After-school Programs and STEM Learning: A View from Another Window*. Oregon Sea Grant.

Doering, Z., and A. Bickford. 1997. *Visitors to the Smithsonian Institution: A Summary of Studies*. Washington, D.C.: Institutional Studies Office, Smithsonian Institution.

European Commission. 2004. *Europe Needs More Scientists: Report by the High Level Group on Increasing Human Resources for Science and Technology*. European Commission, Science and Society, Brussels, April 2, 2004. Accessed at

http://ec.europa.eu/research/conferences/2004/sciprof/pdf/final_en.pdf.

Falk, John, and Lynn Dierking. 2010. The 95 percent solution. *American Scientist* 98(6): 486.

Findlen, P. 1994. *Possessing Nature: Museums, Collecting, and Scientific Culture in Early Modern Italy*. Berkeley and Los Angeles: University of California Press.

Henriksen, Ellen K., and Merethe Frøyland. 2000. The contribution of museums to scientific literacy: Views from audience and museum professionals. *Public Understanding of Science* 9(4): 393–415.

Hood, M. G. 1983. Staying away: Why people choose not to visit museums. *Museum News* 62(2): 50–57.

Kirchberg, Volker. 1996. Museum visitors and non-visitors in Germany: A representative survey. *Poetics* 24(2–4): 239–258.

Kisiel, James. 2004. The nature of museums: Visitor conceptions and the traditional role of natural history museums. *The Informal Learning Review* 68(Sept.-Oct.).

Korn, Randi. 1995. An analysis of differences between visitors at natural history museums and science centers. *Curator: The Museum Journal* 38(3): 150–160.

Lin, Yung-Neng. 2006. Leisure—a function of museums? The Taiwan perspective. *Museum Management and Curatorship* 21(4): 302–316.

Linton, J., and G. Young. 1992. A survey of visitors at an art gallery, cultural history museum, science center, and zoo. *ILVS Review: A Journal of Visitor Behavior* 2(2): 239–259.

Miller, Jon D. 2010. Adult science learning in the internet era. *Curator: The Museum Journal* 53(2): 191–208.

Moos, Thyge, and Ida Brændholdt Lundgaard. 2009. *National brugerundersøgelse på de statslige og statsanerkendte museer i Danmark – 2009*. Copenhagen: Kulturarvsstyrelsen.

———. 2010. *National User Survey at the National and Government-approved Museums in Denmark – 2010*, Thyge Moos and Ida Brændholdt Lundgaard, eds. Copenhagen: Heritage Agency of Denmark.

Osborne, J., and J. Dillon. 2008. *Science Education in Europe: Critical Reflections, A Report to the Nuffield Foundation*. London: Nuffield Foundation. Accessed at http://efepereth.wdfiles.com/local–files/science-education/Sci_Ed_in_Europe_Report_Final.pdf.

Paris, Scott G., Kirsten M. Yambor, and Becky Wai-Ling Packard. 1998. Hands-on biology: A museum-school-university partnership for enhancing students' interest and learning in science. *The Elementary School Journal* 98(3): 267–288.

Pekarik, Andrew J., Zahava D. Doering, and David A. Karns. 1999. Exploring satisfying experiences in museums. *Curator: The Museum Journal* 42(2): 152–173.

Rennie, Léonie J., and Gina F. Williams. 2006. Adults' learning about science in free-choice settings. *International Journal of Science Education* 28(8): 871–893.

Sanford, Camellia, Karen Knutson, and Kevin Crowley. 2007. "We always spend time together on Sundays": How grandparents and their grandchildren think about and use informal learning spaces. *Visitor Studies* 10(2): 136–151.

Sjøberg, S., and C. Schreiner. 2010. *The ROSE project. Overview and key findings*. Oslo, Norway: University of Oslo.

Smithsonian Institution. 2010. *Nature, Science and Culture on Display: Results from the 2009–2010 National Museum of Natural History Visitor Survey*. Office of Policy and Analysis: Smithsonian Institution.

Steiner, Mary Ann, and Kevin Crowley. 2013. The natural history museum: Taking on a learning agenda. *Curator: The Museum Journal* 56(2): 267–272.

Valdecasas, Antonio G., and Ana M. Correas. 2010. Science literacy and natural history museums. *Journal of Biosciences* 35(4): 507–514.

Watson, Bill, and Shari Rosenstein Werb. 2013. One hundred strong: A colloquium on transforming natural history museums in the twenty-first century. *Curator: The Museum Journal* 56(2): 255–265.

Yanni, C. 2005. *Nature's Museums: Victorian Science and the Architecture of Display*. Princeton: Princeton Architectural Press.

APPENDIX: THE QUESTIONNAIRE USED IN TELEPHONE INTERVIEWS

Q1. [Warm-up question:] Which words, thoughts, images do you associate with going to museums (any type)?

Q2. [Warm-up question:] Which words, thoughts, images do you associate with going to natural history museums?

Q3. On a scale of 1 to 5, with 1 corresponding to "I disagree completely" and 5 corresponding "I agree completely," to what extent do you think that natural history museums are primarily aimed at children? [A don't-know option was also allowed.]

Q4. [Posted to respondents who answered 4 or 5 in Q3:] Does this children focus of natural history museums make you likely to visit, stay away or doesn't it have any influence?

1. visit
2. stay away
3. don't know
4. no influence

Q5. On a scale of 1 to 5, with 1 corresponding to not at all and 5 corresponding to very much, in your opinion, to what extent does a natural history museum expect visitors to learn during their visit?

Q6. On a scale of 1 to 5, with 1 corresponding to "I disagree completely" and 5 corresponding "I agree completely," to what extent do you think that art museums are primarily aimed at children? [A don't know option was also allowed.]

Q7. [Posted to respondents who answered 4 or 5 in Q3:] Does this children focus of art museums make you likely to visit, stay away, or doesn't it have any influence?

1. visit
2. stay away
3. don't know
4. no influence

Q8. On a scale of 1 to 5, with 1 corresponding to not at all and 5 corresponding to very much, in your opinion, to what extent does an art museum expect visitors to learn during their visit?

Q9. On a scale of 1 to 5, with 1 corresponding to not at all and 5 corresponding to very much, in your opinion, to what extent does a science center expect visitors to learn during their visit? [Danish examples of science centers were given.]

Q10. How often do you visit a museum (any type)?

1. 0 times per year
2. 1–3 times per year
3. More than 3 times per year
4. Don't know/don't remember

Q11. Have you visited a natural history museum?

1. Yes > Please specify
2. No/Don't know

Q12. What is your age?

1. Under 29 years
2. 30–49 years
3. 50–65 years
4. Over 66 years
5. No answer

Q13. Are you a parent or grandparent?

1. Yes
2. No

Q14. What is your latest completed education?

1. No education
2. Elementary school
3. Upper secondary school/craftsman
4. Short-cycle higher education
5. Medium-cycle higher education
6. Long-cycle higher education