

**Summative Evaluation**  
*Search for Life*

**Prepared for the New York Hall of Science**

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## EXECUTIVE SUMMARY

This report presents the findings of a summative evaluation of *The Search for Life* conducted by Randi Korn & Associates, Inc. (RK&A), for The New York Hall of Science (NY Hall) in Queens, New York. *The Search for Life* was developed by NY Hall staff and funded by the National Science Foundation, NASA and NASA Astrobiology Institute, New York City Department of Cultural Affairs with funds from the Office of the Mayor, Institute for Library Services, Anonymous and Wyeth. Data collection took place in October 2005. The evaluation documents the exhibition's impact and effectiveness using timing and tracking observations and exit interviews.

Selected highlights of the study are included in this summary. Please consult the body of the report for a detailed account of the findings.

### I. PRINCIPAL FINDINGS: TIMING AND TRACKING OBSERVATIONS

Data collectors trained by RK&A observed 103 walk-in visitors, ages nine years and older.

#### *Data Collection Conditions*

- The majority of observations were conducted on weekends with low visitation and few broken exhibits.
- 54 percent of observed visitors interacted with staff one or more times while in the exhibition.

#### *Visitor Demographics*

- 84 percent were visiting in groups of both adults and children (i.e., “family” groups).
- 65 percent of observed visitors were adults and 35 percent were children.
- 51 percent were females and 49 percent were males.

#### *Overall Visitation Patterns*

- Visitors spent a median time of 12 minutes in *The Search for Life*.
- Visitors in *The Search for Life* moved more slowly than visitors in exhibitions of similar size.
- Visitors stopped at a median of 10 exhibits (24 percent of available exhibits).<sup>1</sup>
- Visitors stopped at fewer exhibits in *The Search for Life* compared with exhibitions of similar size.

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<sup>1</sup> *The Search for Life* included 51 exhibits at which visitors could stop. For this evaluation, a “stop” was defined as a visitor engaging with an exhibit for three seconds or longer.

### *Visitation of Each Exhibit Type*

- Visitors spent the most time at manipulative/physical interactives (median time of 4 minutes, 29 seconds).
- Visitors spent the least time at living displays and graphics (median time 30 seconds and 20 seconds, respectively).

### *Stops at Each Exhibit Type*

- Nearly all visitors stopped at manipulative/physical interactives (98 percent).
- More than three-quarters of visitors stopped at immersive environments and science sculptures (79 percent each)
- The fewest visitors stopped at graphics (44 percent).

### *Visitation to Individual Exhibits*

- Exhibit with longest dwell time: the How Much of You Is Water? manipulative/physical interactive (median time of 2 minutes, 3 seconds).
- Exhibit with shortest dwell time: *The Search for Life* Introductory Panel graphics (median times of 4 seconds). Four of the five exhibits with the lowest dwell times were graphics.
- Two most visited exhibits: Comets Created Our Oceans science sculpture (68 percent) and Which is Colder? manipulative/physical interactive (63 percent).
- Two least visited exhibits: Will We Find Life on Titan? graphics, and Will We Find Life Beyond Our Solar System? graphics (1 percent each).

### *Behaviors<sup>2</sup>*

- Most common behaviors: had social interactions (88 percent), engaged in sensory experiences (83 percent), and did activities (82 percent).
- Least common behavior: watching videos (57 percent).
- Females were more likely to engage in coaching than were males.
- More than half (34 visitors) of the 60 who stopped at the See Cosmic Rays from Outer Space exhibit climbed up the steps of the visual display. One-half (30 visitors) read the wall panel.
- None of the 19 visitors who stopped at the What Do You Think? exhibit posted a message. Perhaps this was because post-it notes were unavailable in the exhibit for nearly all (16 visitors) of them. Most (14 visitors) read the posted messages on the display board.

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<sup>2</sup> Data collectors noted several behaviors: social interaction related to exhibits, coaching related to exhibits, interacting with staff, watching videos, and touching, smelling, moving, and/or using interactive exhibits.

## II. PRINCIPAL FINDINGS: EXIT INTERVIEWS

RK&A conducted 54 interviews with 96 visitors—61 adults and 35 children.

### *Overall Reactions to Search for Life*

- Overall, interviewees said they enjoyed their visit to *Search for Life*. Most interviewees found the exhibition’s design to be hands-on, gratifying, easy to understand, and unique.
- When asked what they enjoyed most about the exhibition, about one-half of adult and child interviewees were most interested in the exhibits that illustrated or demonstrated a phenomenon, including *How Much of You is Water?*, *Comets* sculpture, and *Which is Colder?* About one-third of interviewees, especially children, liked the exhibits that immersed them in a unique environment and allowed them to take on the role of a scientist, including *Mars Rover*, *Alvin*, and the *Hubble Telescope*.
- About one-third of interviewees said there was not anything they disliked about the exhibition. Of the remaining interviewees, most found fault with exhibits they said were “pointless” or difficult to understand, including *Alvin*, the smell exhibits, and the *See Cosmic Rays from Outer Space*.

### *Understanding of Search for Life*

- Nearly one-half of the interviewees, all adults, said that the exhibition was about understanding life in extreme places on Earth to help us search for life on other planets. Several of these also went on to explain that where we find water, we may find life, even on other planets.
- About one-fifth of interviewees, adults and children, said the exhibition primarily showed visitors that water is important to life, though they did not directly discuss the connection of this to searching for life on other planets.
- One-fifth of interviewees—mostly children—said the exhibition was about outer space, planets, or astronauts.

### *Group Experiences*

- Nearly one-half of interviewees, all intergenerational, said what they liked about visiting as a group was interacting with their family and watching their children learn and enjoy themselves. One-fifth, all parents visiting with children, said they did not really interact as a group, rather their children ran ahead and the parents followed.
- Three-quarters of interviewees said they had some group discussions while visiting *Search for Life*. Many of these interviewees said discussions were sparked by exhibits that surprised them, such as *Which is Colder?*, *How Much of You is Water?*, *Comets* sculpture, *See Cosmic Rays from Outer Space*, and *Mars Rock*.

- When asked whether they thought they would discuss anything about the exhibition after their visit, most interviewees said they would discuss how fun the exhibition was. One said she would discuss the question of whether there might be life on other planets given her new understanding of the subject.

#### *Experiences with Hall of Science Explainers*

- One-half of interviewees said they interacted with staff at some point during their visit in *Search for Life*. Of those, about one-half said an explainer helped them understand what an exhibit demonstrated.

#### *Experiences at What Do You Think? Feedback Board*

- More than two-thirds of interviewees noticed What do you Think?, a visitor feedback board that invited visitors to respond in writing to two questions about space exploration and searching for life on other planets. Of those interviewees, none wrote a response. Additionally, of the interviewees who noticed the exhibit, about one-half read at least some of the responses, and of those, about one-half found them interesting.

## DISCUSSION

The New York Hall of Science's *Search for Life* provides visitors with an interactive and dynamic experience. Most notably, visitors appreciated *Search for Life*'s hands-on, visually stimulating exhibits, the fact that the exhibits were varied enough to appeal to a wide age range, and the opportunities the exhibit provided for visitors to interact with Museum staff members. Moreover, many adults understood the exhibition's big idea—that our search for life on other planets begins by looking at extreme environments on Earth that may be similar to environments on other planets. On the other hand, the exhibition did not stimulate most visitors to discuss or think deeply about issues regarding space exploration and life on other planets—something Hall of Science staff would have liked. This discussion highlights these and other key findings, including these main issues:

- *The Search for Life*'s Big Idea was understood by one-half of adults, but no children<sup>3</sup>.
- When compared with a database of visitors' behaviors in similar exhibitions, visitors spent more time in *Search for Life*, but used far fewer of its exhibition components.
- *Search for Life* was comprised of many different types of exhibits, which worked to the exhibition's advantage by providing something for everybody.
- Adult-child interaction was high, and parents found the exhibition satisfying.
- Though videos held a prominent place in the exhibition, compared to the use of other exhibit types, they were not used often.
- Many visitors had interactions with staff explainers, and these interactions contributed positively to their overall experience.
- The exhibition did not engage most visitors in thinking more deeply about or discussing whether life might exist on other planets.

***Search for Life*'s Big Idea was understood by one-half adults, but no children.** At the heart of any well-crafted exhibition is a Big Idea (Serrell, 1996). Naturally, exhibition developers hope that visitors will walk away from an exhibition understanding this Big Idea. Conveying Big Ideas, especially those with complicated science content is difficult, and *Search for Life* has a particularly complex Big Idea. The exhibition's Big Idea is that our search for life on other planets begins by looking at extreme environments on Earth that may be similar to environments on other planets. In addition, supporting ideas are that life is dependent on water, so where we find water, we may find life; and microbes are simple forms of life that we find in extreme environments and that we may find on other planets. Not only is this a complicated idea, it is surprising and maybe even counterintuitive given pop culture's emphasis on finding intelligent life on other planets through "close encounters" and UFOs.

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<sup>3</sup> It is fair to say that some children may have understood the big idea, or at least part of it, but could not articulate it in interviews. Furthermore, though interviews were conducted with groups that included adults and children, adults did much of the talking. Children with the adults who understood the big idea likely grasped aspects of it.

Thus, it is quite an achievement that the exhibition was successful in conveying this idea to one-half of adult visitors, and not surprising that the idea eluded children. An examination of the exhibition reveals factors that appear to have contributed to these findings. Too often, exhibitions are designed in a fragmented way, with only one opportunity for visitors to grasp the main idea, but *Search for Life* was designed so that its main idea was repeated and consistent, particularly in multiple brief text panels and videos, at which about one-half of visitors stopped.

On the other hand, the lack of the main idea in most of the interactive and manipulative exhibits may account for why children and some adults tended to think the exhibition was simply about space exploration or the importance of water to life. For example, at Alvin, a well-liked exhibit, visitors pretended to search under rocks at the bottom of the ocean. And though the popular How Much of You is Water? conveyed the idea that water is important to life, it did not connect this idea to our search for life on other planets. Other popular exhibits, such as Comets Created our Oceans and Which is Colder? did not advance the exhibit's Big Idea. Studies find that interactive exhibits in science exhibitions are almost always the most popular exhibits, thus it is important to integrate Big Ideas into these experiences as much as possible rather than relying solely on text and video.

**When compared to a database of visitors' behaviors in similar exhibitions, visitors spent more time in *Search for Life*, but used fewer of its exhibition components.** Comparing behaviors in *Search for Life* to behaviors in other exhibitions is one measure of its success. It is up to the *Search for Life* team members to decide how long they would like visitors to stay and how much of the exhibition they would like them to use. Nevertheless, the comparison can provide insight. On a positive note, visitors to *Search for Life* spent more time in the exhibition than did visitors to other similarly sized exhibitions (Serrell, 1998). On the other hand, they used the exhibition much less thoroughly, meaning they used far fewer exhibition components than did visitors to other similar exhibitions (Serrell, 1998). Taken together, these two pieces of data show that visitors spent a long time at a few exhibits—notably, the interactives. The Hall of Science should be commended for developing such attractive and engaging interactive exhibits. However, the fact that visitors focused most of their attention on interactives helps explain why the children and one-half of the adults did not describe the Big Idea since, as stated previously, most of the interactives did not advance the Big Idea.

***Search for Life* is comprised of many different types of exhibits, which worked to the exhibition's advantage by providing something for everybody.** Interview findings show that visitors' favorite exhibit components varied and depended on personal preferences and interests. Moreover, some interviewees noted that the exhibition varied in the mediums it used and appreciated that it incorporated all the senses, especially smell, sight, and touch. Furthermore, observation findings show that, except for the computer interactive, at least 44 percent of visitors stopped at each of the eight exhibit types. This variety of exhibits contributed to the fact that the exhibition was dynamic and well received by nearly all the visitors.

**Adult-child interaction was high, and parents found the exhibition satisfying.** The observations showed that parents in the exhibition were actively involved with their children's experiences. The exhibits fostered coaching (see Appendix C for a definition of coaching) in a

majority of visiting groups (70 percent), and this behavior is associated with learning in museums (Borun, et. al., 1996). A review of summative evaluations of other science exhibitions shows that this behavior was much more prevalent in *Search for Life*. For example, in an exhibition about invention, coaching was observed in 54 percent of visitor groups; in an exhibition about cellular biology it was observed in 36 percent, and in an exhibition about tissues, it was observed in 22 percent (RK&A, 2004a, 2003a, and 2004b). Comparisons such as these are inconclusive since each exhibition and evaluation is unique; however, the comparison does provide a frame of reference and cause one to speculate on why coaching was so high in *Search for Life*. One explanation may simply be demographics. *Search for Life* had a greater number of visitor groups composed of adults and children when compared with the three examples above (80 percent compared with 65 percent, 57 percent, and 67 percent, respectively). Another explanation may be the exhibits themselves. Coaching occurred most often at Which is Colder?, Comets Created our Oceans, and How Much of You is Water? These exhibits were also named often as visitors' favorites, possibly because they fueled parent-child interaction, and thus became memorable. It is worth exhibit developer's time to examine these exhibits to tease out what makes them successful and to use that knowledge to inform future exhibitions.

**Though videos held a prominent place in the exhibition, compared to the use of other exhibit types, they were not used often.** *Search for Life* included six videos, three of which introduced the Earth comparisons. Slightly more than one-half of visitors stopped at one or more of these videos. Compared to other science exhibitions that employed videos in a similar way, *Search for Life* performed well (57 percent of visitors stopping in *Search for Life* compared to 35 percent in *Net Planet* and 33 percent in *Strange Matter*) (RK&A 2005b and RK&A 2004b). Nevertheless, when compared to other exhibit types in *Strange Matter*, including interactives, immersive environments, science sculptures, and artifacts, videos ranked low in visitor usage. This is a common trend in science exhibitions; except in the case of videos projected on large screens with seating, visitors do not use video exhibits more frequently than other exhibit types. Unfortunately, no data exists to explain this phenomenon, but one can speculate on why this is the case. Overwhelmingly, visitors' behaviors and testimony indicate that they go to museums to see things they cannot see anywhere else, especially real objects and interactive exhibits. Videos simply are not unique to visitors, who are bombarded by media images in everyday life. One remedy for videos' low attraction power may be to provide seating. Seating has been found to increase dwell time at various types of exhibits.

**Many visitors had interactions with staff explainers, and these interactions contributed positively to their overall experience.** The number of visitor interactions with staff was high, with one-half engaging in one or more of these interactions. Moreover, interviews show that these interactions were informational, engaging, and fun for visitors. When compared to staff interactions in other science exhibitions, the significance of this finding becomes more apparent. In six other summative evaluations conducted by RK&A between 2003 and 2005, only 14 to 38 percent of visitors had staff interactions (2002a, 2003b, 2003c, 2004a, 2004b, and 2005a). Once again, this type of comparison is inconclusive because in each of these cases, the institution housing the exhibition was unique, with different objectives regarding staff interactions. However, these numbers clearly demonstrate a solid commitment by the Hall of Science to engage its visitors with its staff. For example, through a program called the Career Ladder Program, the Hall of Science provides a diverse group of 250 young people (known as

Explainers) each year with educational opportunities, employment, training, and strong peer-oriented mentorship. Typically, two to four of these Explainers are stationed in *Search for Life* at any one time. During the evaluation period, they were often seen at Comets Created our Earth and How Much of You is Water? and most of them frequently helped visitors understand how an exhibit worked or what it was meant to show. As some visitors said in interviews, Explainers were not only helpful, but obviously excited by the science content. The Explainers' impact on the experience of visitors to *Search for Life* is just one example of the effectiveness of the Explainer's program (see also Sabo, 2005 and ILI, 2002).

**The exhibition did not engage most visitors in thinking more deeply or discussing whether life might exist on other planets.** *Search for Life* engages visitors in a topic that has intrigued mankind for many, many years. Whether there is life on other planets is a topic that most people tend to have an opinion on or at the very least have probably thought about in their lifetime. As such, Hall of Science staff was curious to know whether the exhibition stimulated visitors' thoughts or discussion. Two indicators were used to gauge this: whether visitors read or responded to the feedback exhibit What do You Think? and what they talked about as they walked through the exhibition. Both indicators showed that, for the most part, visitors viewed the exhibition as an opportunity to have a fun, as a social experience with friends and family rather than to discuss or think deeply about life on other planets. For instance, when asked what visitors discussed in *Search for Life*, most said they discussed specific exhibits, such as how they worked or how much fun they were. And while interviews and observations show that a portion of visitors read the postings on the feedback exhibit, none left their own response (it should be noted that much of the time, there was no paper available to leave a response, but even so, in interviews most of these visitors said they would not have left a response anyway). One visitor who said she would continue to think about and discuss the topic after leaving the exhibition noted that she has a strong prior interest in the topic. These findings are not surprising when one examines other visitor studies literature. For instance, Marilyn Hood found that the average museum visitor values social interaction over learning when visiting an exhibition (1995). And other RK&A studies show that low tech feedback exhibits, such as What do You Think? are typically underutilized (2000, 2002b, and 2004b). To engage visitors in in-depth thoughts and discussion, a more effective approach may be a facilitated public program.

In conclusion, the New York Hall of Science's *Search for Life* proved to be a valuable experience for its audience. Visitors of all types and ages enjoyed the exhibition, especially the hands-on aspects. Visitors had a dynamic and socially interactive experience, both among themselves and with staff. And, finally, many adults gained a solid understanding of the exhibition's intriguing Big Idea.

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## INTRODUCTION

This report presents the findings of a summative evaluation of *Search for Life*, conducted by Randi Korn & Associates, Inc. (RK&A), for the New York Hall of Science in Queens, New York. *The Search for Life* was developed by NY Hall staff and funded by the National Science Foundation, NASA and NASA Astrobiology Institute, New York City Department of Cultural Affairs with funds from the Office of the Mayor, Institute for Library Services, Anonymous and Wyeth. Data collection took place in October 2005. The evaluation documents the scope of the exhibition's impact and effectiveness via timing and tracking observations and exit interviews. The evaluation's objectives were to:

- Identify what meaning visitors make from their experience;
- Determine whether visitors understand that the exhibition explains that:
  - Life is dependent on water
  - Our search for life on other planets begins by looking at extreme environments on Earth that may be similar to environments on other planets
  - Microbes are simple forms of life; these are the life forms we find in extreme environments and we may find on other planets;
- Determine whether the exhibition encouraged social interaction and discussion;
- Gauge visitors' opinions of the feedback board;
- Identify how staff explainers and volunteers influence the visitor experience;
- Determine which exhibits visitors use;
- Determine the amount of time visitors spend using individual exhibits;
- Determine the total amount of time visitors spend in the exhibition; and
- Identify specific behaviors visitors display as they use the exhibits.

## METHODOLOGY

RK&A used two data collection strategies to assess visitors' experiences in *The Search for Life*: timing and tracking observations and uncued exit interviews.

### *Timing and Tracking Observations*

Visitor observations provide an objective and quantitative account of how visitors behave and react to exhibition components. Observational data indicate how much time visitors spend within an exhibition and suggest the range of visitor behaviors.

All visitors nine years of age and older were eligible to be unobtrusively observed in the exhibition. The evaluator selected visitors to observe using a continuous random sampling method. In accordance with this method, the observer stationed herself at the exhibition's entrance, and observed the first eligible visitor to enter, following that visitor through the exhibition, recording the exhibits used, noting select behaviors, and logging total time spent in the exhibition (see Appendix A for the observation form). When the visitor completed his or her visit, the observer returned to the entrance to await the next eligible visitor to enter the exhibition.

In addition to recording stops made and time spent at each exhibit, the data collector also noted specific behaviors listed on the observation form. See Appendix B for a definition of two of these behaviors.

### *Exit Interviews*

Open-ended interviews motivate interviewees to describe their experiences, express their opinions and feelings, and share with the interviewer the meaning they constructed from an experience. Open-ended interviews produce data rich in information because interviewees talk about their experiences from a personal perspective.

Upon exiting the exhibition, visitor groups, including children nine years of age and older, were eligible to be selected (following a continuous random sampling method, as described above) to answer several questions about their experiences (see Appendix C for the interview guide). The interview guide was intentionally open-ended to allow all interviewees to discuss what they felt was meaningful. All interviews were tape-recorded with participants' permission and transcribed to facilitate analysis.

## DATA ANALYSIS

### *Quantitative Analysis*

The quantitative observational data were entered into a computer and analyzed statistically using SPSS for Windows, a statistical package for personal computers. Frequency distributions were calculated for all categorical variables (e.g., gender, age group). To examine the relationship between two categorical variables (e.g., use of an exhibit and age group), cross-tabulation tables were computed to show the joint frequency distribution of the two variables, and the chi-square statistic ( $\chi^2$ ) was used to test the significance of the relationship.

Summary statistics, including the mean (average), median (data point at which half the responses fall above and half fall below), and standard deviation (spread of scores: “±” in tables), were calculated for the time data.<sup>4</sup> To compare the means of two or more groups, an analysis of variance (ANOVA) was performed. The level of significance was set at 0.05 because of the moderate sample size. When the level of significance is set to  $p = 0.05$ , any relationship that exists at a probability ( $p$ -value) of  $\leq 0.05$  is termed “significant.” When a relationship has a  $p$ -value of 0.05, there is a 95 percent probability that the relationship being explored truly exists; that is, in 95 out of 100 cases, there would be a relationship between the two variables (e.g., gender and preferences for visiting). Conversely, there is a 5 percent probability that the relationship does not exist; in other words, in 5 out of 100 cases, a relationship would appear by chance. Within the body of the report, only statistically significant results are discussed.

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<sup>4</sup> For the most part, medians rather than means are reported in this document because, as is typical, the number of components used and the time spent by visitors were distributed unevenly across the range. For example, whereas most visitors spent a relatively brief time with exhibition components, a few spent an unusually long time. When the distribution of scores is extremely asymmetrical (i.e., “lopsided”), the mean is strongly affected by the extreme scores and, consequently, falls further away from the distribution's central area. In such cases, the median is the preferred measurement because it is not sensitive to the values of scores above and below it—only to the number of such scores.

## *Qualitative Analysis*

Visitors' responses to interview questions were analyzed qualitatively, meaning that the evaluator studied the responses for meaningful patterns, and as patterns and trends emerged, grouped together similar responses. These trends are illustrated with verbatim quotations.

## REPORTING METHOD

The data in this report are both quantitative and qualitative. For the quantitative data, tables and graphs display the information. Percentages within tables may not always equal 100 owing to rounding. The findings within each topic are presented in descending order, starting with the most frequently occurring.

The interview data are presented in narrative. The interviewer's remarks appear in parentheses, and, for visitors, an asterisk (\*) signifies the start of a different speaker's comments. At the end of each quotation, the interviewee's status (adult or child) is indicated in brackets. Trends and themes in the interview data are also presented from most- to least-frequently occurring.

Findings in each report are presented in three main sections:

- I. Timing and Tracking Observations
- II. Exit Interviews

## I. PRINCIPAL FINDINGS: TIMING AND TRACKING OBSERVATIONS

Data collectors trained by RK&A observed 103 walk-in visitors, ages nine years and older, in *The Search for Life* exhibition over three weekends in October 2005.

### DATA COLLECTION CONDITIONS

Data collectors conducted the majority of observations on weekends when there was low visitation with few broken exhibits (see Table 1). Additionally, 54 percent of visitors interacted with staff one or more times while in the exhibition.

**Table 1**  
**Data Collection Conditions**  
(*n* = 103)

<b>Condition</b>	<b>%</b>
<b>Crowding Level</b>	
Few	51
Moderate	38
Crowded	12
<b>Broken Exhibits*</b>	
One broken exhibit encountered	39
No broken exhibits encountered	34
Two or more broken exhibits encountered	27
<b>Staff Interactions</b>	
One or more	54
None	46

\*The following exhibits were broken during the observations: Send a Rover All Over (4 times), Speed Comes with Practice (36 times), See the Mud Flask (21 times), Methane Microbes (4 times), Life Hunter (21 times), and What Do You Think? (16 times).

## VISITOR DEMOGRAPHICS

As shown in Table 2, the total sample of visitors observed included slightly more females than males (51 percent and 49 percent, respectively). More than one-half of visitors (65 percent) were adults (19 years of age and older) and less than one-half were children (35 percent).

**Table 2**  
**Visitor Demographics**

<b>Characteristic</b>	<b>%</b>
<b>Gender (<i>n</i> = 98)</b>	
Female	51
Male	49
<b>Age Group (in years) (<i>n</i> = 103)</b>	
9 to 10	18
11 to 12	8
13 to 15	6
16 to 18	4
19 to 24	0
25 to 34	19
35 to 44	35
45 to 54	6
55 to 64	2
65 and older	3

As presented in Table 3, the majority of visitors in the sample were in groups of both adults and children (84 percent).

**Table 3**  
**Group Composition**  
**(*n* = 102)**

<b>Group Composition</b>	<b>%</b>
Adults and children	84
Adults only	6
Alone	5
Children only	5

## OVERALL VISITATION PATTERNS

### *Total Time Spent in the Exhibition*

Visitors spent a median time of about 12 and one-half minutes in *The Search for Life* (see Table 4). The shortest time a visitor spent in the exhibition was about 2 and one-half minutes and the longest time was more than 1 hour.

**Table 4**  
**Total Time Spent in *The Search for Life***  
**(n = 103)**

Total Time				
Median	Minimum	Maximum	Mean	±
12 minutes, 27 seconds	2 minutes, 33 seconds	1 hour, 6 minutes, 18 seconds	14 minutes, 29 seconds	10 minutes, 17 seconds

To compare *The Search for Life* with other exhibitions of similar size, RK&A used Serrell’s “Sweep Rate Index” (SRI).<sup>5</sup> The SRI is calculated by dividing the exhibition’s square footage<sup>6</sup> by the average total time spent in the exhibition.<sup>7</sup> The lower the SRI, the more time visitors spent per square foot of space. The SRI for *The Search for Life* is 220.9 square feet per minute. The SRI for *The Search for Life* is slightly lower than other small, nondiorama exhibitions.<sup>8</sup> This means that visitors in *The Search for Life* are moving slower than visitors in exhibitions of similar size.

### *Total Number of Exhibits Stopped At*

*The Search for Life* included 51 exhibits at which visitors could stop. **For this evaluation, a “stop” was defined as a visitor standing for three seconds or longer in front of a component. If a visitor returned to a component at which s/he had previously stopped, this return was not counted as an additional stop, but the amount of time spent was included in the total time spent at the component.**

Visitors stopped at between 1 and 32 exhibits in *The Search for Life* (see Table 5 next page). Visitors stopped at a median of 10 exhibits (24 percent of available exhibits) in *The Search for Life*.

<sup>5</sup> Serrell, B. (1998). “Paying Attention: Visitors and Museum Exhibitions.” Washington, D.C., American Association of Museums.

<sup>6</sup> *The Search for Life* is 3200 square feet.

<sup>7</sup> The average total times were used in the SRI calculation in accordance with Serrell’s methods. Throughout the rest of the report, the median times are reported, as the median is standard for time data unevenly distributed across its range.

<sup>8</sup> Serrell reports an average SRI of 244.3 (±104.8) for small (under 3,900 square feet), nondiorama exhibitions.

**Table 5**  
**Total Number of Exhibits Stopped at in *The Search for Life***  
**(*n* = 103)**

<b>Median</b>	<b>Minimum</b>	<b>Maximum</b>	<b>Mean</b>	<b>±</b>
10	1	32	11	7

RK&A also used Serrell’s “Percentage Diligent Visitor Index” (%DV) to compare *The Search for Life* with other exhibitions of similar size.<sup>9</sup> The %DV is obtained by calculating the percentage of visitors that stopped at more than one-half of the exhibits. The higher the %DV, the more thoroughly visitors used the exhibition. The %DV for *The Search for Life* is 3 percent—that is, three visitors stopped at more than one-half of the exhibits. As such, the %DV for *The Search for Life* is much lower than Serrell’s average %DV for small, nondiorama exhibitions.<sup>10</sup> This means visitors stopped at fewer exhibits in *The Search for Life* compared with exhibitions of similar size.

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<sup>9</sup> Serrell, B., “Paying Attention: Visitors and Museum Exhibitions,” Washington, D.C., American Association of Museums, 1998.

<sup>10</sup> Serrell reports an average %DV of 29.7 percent (±22.8) for small (<3,900 square feet), nondiorama exhibitions.

## VISITATION OF EACH EXHIBIT TYPE

The exhibition included eight types of exhibits: artifact, science sculpture, computer interactive, graphics, immersive environment, living display, manipulative/physical interactive, and video.

### *Time Spent at Each Exhibit Type*

RK&A summed the time spent at individual exhibits by exhibit type and found that visitors spent the most time at manipulative/physical interactives (median time of 4 minutes, 29 seconds) (see Table 6).

Visitors spent the least time at living displays and graphics (median times of 30 seconds and 20 seconds, respectively).

**Table 6**  
**Time Spent at Each Exhibit Type**

<b>Exhibit Type*</b>	<b>Number of Exhibits Available</b>	<b>Number of Visitors Stopping</b>	<b>Median Time</b>
Manipulative/physical interactive	14	101	4 minutes, 29 seconds
Immersive Environment	2	81	1 minute, 29 seconds
Science sculpture	2	81	1 minute, 3 seconds
Video	6	59	57 seconds
Computer interactive	1	17	53 seconds
Artifact	7	74	38 seconds
Living display	4	50	30 seconds
Graphics	15	45	20 seconds

\*See the Observation Form in Appendix A for the classification of each exhibit.

*Stops at Each Exhibit Type*

As shown in Table 7, nearly all visitors stopped at manipulative/physical interactives (98 percent). More than three-quarters stopped at immersive environments and science sculptures (each 79 percent). The fewest visitors stopped at computer interactives (17 percent).

**Table 7**  
**Stops Made at Each Exhibit Type**  
**(n = 103)**

<b>Exhibit Type*</b>	<b>Number of Exhibits Available</b>	<b>% of Visitors Stopping</b>	<b>Median Number of Stops</b>
Manipulative/physical interactive	14	98	4
Immersive environment	2	79	1
Science sculpture	2	79	1
Artifact	7	72	2
Video	6	57	2
Living display	4	49	1
Graphics	15	44	2
Computer interactive	1	17	---

\*See the Observation Form in Appendix A for the classification of each exhibit.

## VISITATION AT INDIVIDUAL EXHIBITS

### *Time Spent at Each Exhibit*

See Tables 8 (below) and 9 (next page) for the median times visitors spent at each exhibit.

For data on exhibits at which visitors spent the longest time (exhibits with the longest dwell times), see Table 8. Visitors spent the longest time at the How Much of You Is Water? manipulative/physical interactive (median time of 2 minutes, 3 seconds), followed by the Life At the Extremes: Yellowstone video (median time of 1 minute, 47 seconds).

**Table 8**  
**Median Time Spent at Each Exhibit: Highest Dwell Times**

<b>Exhibit Name</b>	<b><i>n</i></b>	<b>Median Time (Seconds)</b>
How Much of You Is Water? manipulative/physical interactive	58	123
Life at the Extremes: Yellowstone video	15	107
Wherever There's Life There's Water manipulative/physical interactive	46	79
Life at the Extremes: Atacama Desert video	31	73
Alvin immersive environment	57	71
Speed Comes with Practice manipulative/physical interactive	32	70
Comets Created Our Oceans science sculpture	71	66
Life Hunter computer interactive	17	53
Hubbel Space Telescope manipulative/physical interactive	43	48
See How Europa's Ice Surface Changed manipulative/physical interactive	20	45
Send a Rover All Over manipulative/physical interactive	48	42
See Cosmic Rays from Outer Space immersive environment	60	41
Can You Tell If Something's Alive? manipulative/physical interactive	32	39
Deep Sea Large Video	27	34
Life Stinks manipulative/physical interactive	25	33
Is There Life Out There? Graphics	2	33
Which is Colder? Manipulative/physical interactive	65	32
Watch Rio Tinto Microbes living display	43	29
Water In Motion science sculpture	30	28
Life on Mars graphics (2)	4	26
Will We Find Life Beyond Our Solar System? graphics	1	25
Window On the Universe video	18	22
Follow the Water artifact	42	22
Looking for Signs of Life video	11	19
Murchison Meteorite artifact	33	19
Microbes Support Life at Deep Sea Vents artifact	12	19

As shown in Table 9 below, four of the five exhibits with the lowest dwell times were graphics. However, overall, the exhibits at which visitors spent the least time included nearly every type: graphics, artifact, living display, manipulative/physical interactive, and video.

**Table 9**  
**Median Time Spent at Each Exhibit: Lowest Dwell Times**

<b>Exhibit Name</b>	<b><i>n</i></b>	<b>Median Time (Seconds)</b>
Search Deep Space graphics	3	18
Will We Find Life On Europa? graphics	8	18
Touch a Mars Rock artifact	32	18
Will We Find Life On Titan? graphics	1	15
Methane Ice graphics	4	15
Methane Microbes living display	4	14
It's Hot Down Here manipulative/physical interactive	31	13
Smell the Mud manipulative/physical interactive	29	13
See the Mud Flask artifact	13	13
Mud Teems With Micro-Life living display	7	13
Sea Vent Panel graphics	8	13
What's Under the Ice? manipulative/physical interactive	26	13
River of Acid Panel graphics	15	12
How Can Life Survive? artifact	25	11
Step Aboard graphics	7	10
What Do You Think? manipulative/physical interactive	19	10
Microbes Like It Hot living display	12	10
Life at the Extremes: Deep In a Mine video	16	9
Boiling Mud Panel graphics	5	9
Can You Smell a Space Rock? manipulative/physical interactive	19	9
Sunless Mine Panel graphics	16	8
Mine Shafts Lead to Microbes graphics	7	8
Thrive Under Ice Panel graphics	6	8
Rio Tinto Means "Tinted River" artifact	15	7
Introductory Panel graphics (2)	3	4

*Stops Made at Each Exhibit*

See Tables 10 (below) and 11 (next page) for the percentage of visitors stopping at each exhibit.

For data on exhibits at which the most visitors stopped (i.e., exhibits with the strongest attraction power) see Table 10. The most visitors stopped at the Comets Created Our Oceans science sculpture, followed by the Which Is Colder? manipulative/physical interactive (69 percent and 63 percent, respectively).

**Table 10**  
**Percentage of Visitors Stopping At Each Exhibit: Most Visited Exhibits**  
*(n = 103)*

<b>Exhibit Name</b>	<b>%</b>
Comets Created Our Oceans science sculpture	69
Which is Colder? manipulative/physical interactive	63
See Cosmic Rays from Outer Space immersive environment	58
How Much of You Is Water? manipulative/physical interactive	56
Alvin immersive environment	55
Send a Rover All Over manipulative/physical interactive	47
Wherever There's Life There's Water manipulative/physical interactive	45
Watch Rio Tinto Microbes living display	42
Hubbel Space Telescope manipulative/physical interactive	42
Follow the Water artifact	41
Murchison Meteorite artifact	32
Touch a Mars Rock artifact	31
Speed Comes with Practice manipulative/physical interactive	31
Can You Tell If Something's Alive? manipulative/physical interactive	31
Life at the Extremes: Atacama Desert video	30
It's Hot Down Here manipulative/physical interactive	30
Water In Motion science sculpture	29
Smell the Mud manipulative/physical interactive	28
Deep Sea Large Video	26
What's Under the Ice? manipulative/physical interactive	25
How Can Life Survive? artifact	24
Life Stinks manipulative/physical interactive	24
See How Europa's Ice Surface Changed manipulative/physical interactive	19
Can You Smell a Space Rock? manipulative/physical interactive	18
What Do You Think? manipulative/physical interactive	18
Window On the Universe video	18
Life Hunter computer interactive	17

As shown in Table 11, the fewest visitors stopped at Will We Find Life On Titan? graphics and Will We Find Life Beyond Our Solar System? graphics (each 1 percent).

**Table 11**  
**Percentage of Visitors Stopping At Each Exhibit: Least Visited Exhibits**  
*(n = 103)*

<b>Exhibit Name</b>	<b>%</b>
Life at the Extremes: Deep In a Mine video	16
Sunless Mine Panel graphics	16
River of Acid Panel graphics	15
Rio Tinto Means “Tinted River” artifact	15
Life at the Extremes: Yellowstone video	15
See the Mud Flask artifact	13
Microbes Like It Hot living display	12
Microbes Support Life at Deep Sea Vents artifact	12
Looking for Signs of Life video	11
Sea Vent Panel graphics	8
Will We Find Life On Europa? graphics	8
Mine Shafts Lead to Microbes graphics	7
Mud Teems With Micro-Life living display	7
Step Aboard graphics	7
Thrive Under Ice Panel graphics	6
Boiling Mud Panel graphics	5
Life on Mars graphics (2)	4
Methane Ice graphics	4
Methane Microbes living display	4
Introductory Panel graphics (2)	3
Search Deep Space graphics	3
Is There Life Out There? graphics	2
Will We Find Life On Titan? graphics	1
Will We Find Life Beyond Our Solar System? graphics	1

## BEHAVIORS

In addition to noting the time spent and stops made, data collectors noted several behaviors: social interactions<sup>11</sup> related to exhibits, coaching<sup>12</sup> related to exhibits, watching videos, sensory experiences (e.g., smelling and touching), and doing activities (e.g., moving the rover, assembling a puzzle, using microscopes, writing a comment at the What Do You Think? exhibit).

### *Summary of Behaviors*

As shown in Table 12, visitors most often had social interactions, engaged in sensory experiences, and did activities (88 percent, 83 percent, and 82 percent, respectively). The least common behavior was watching videos (57 percent). Behaviors at each exhibit are presented in tables in Appendix D.

**Table 12**  
**Summary of Behaviors**  
(*n* = 103)

<b>Behavior</b>	<b>%</b>
Social interactions	88
Sensory experiences	83
Doing activities	82
Coaching	70
Watching videos	57

When RK&A compared behaviors among demographic characteristics and data collection conditions, the evaluator found one statistically significant difference (see Table 13). Females were more likely to engage in coaching than were men.

**Table 13**  
**Differences in Coaching by Gender**

<b>Behavior</b>	<b>Female (%)</b>	<b>Male (%)</b>
Coached at one or more exhibits*	80	60

\* $\chi^2=4.508$ ;  $df=1$ ;  $p=0.034$

<sup>11</sup> Social interaction—when visitors verbally interacted with one another while using exhibits—was defined as a behavior separate from coaching (see Appendix B for definitions of exhibit behaviors).

<sup>12</sup> Coaching—when visitors verbally instructed other visitors while using exhibits—was defined as a behavior separate from social interaction (see Appendix B for definitions of exhibit behaviors).

*Behaviors in See Cosmic Rays from Outer Space*

As shown in Table 14, slightly more than one-half (34 visitors) of visitors climbed the steps to view the visual display (i.e., See Cosmic Rays from Outer Space) and one-half (30 visitors) read the wall panel among the 60 visitors who stopped at the See Cosmic Rays from Outer Space immersive environment. Among the 30 visitors who read the wall panel, 18 visitors spent 10 seconds or longer reading the wall panel, while 12 spent less than 10 seconds reading the wall panel.

**Table 14**  
**See Cosmic Rays from Outer Space immersive environment**  
**(n = 60)**

<b>Activity Description</b>	<b>Number of Visitors</b>
Climbed steps	34
Read wall panel $\geq$ 10 seconds	18
Read wall panel $<$ 10 seconds	12

*Behaviors related to What Do You Think?*

As shown in Table 15, of the 19 visitors who stopped at the What Do You Think? manipulative/physical interactive, none posted a message onto the exhibit's message board. Perhaps this was because post-it notes were unavailable in the exhibit for nearly all (16 visitors) of them. Nevertheless, 14 visitors read the posted messages on the display board.

**Table 15**  
**What Do You Think? Manipulative/Physical Interactive**  
**(n = 19)**

<b>Description</b>	<b>Number of Visitors</b>
Post-it notes unavailable	16
Read messages	14
Left message	0

## II. PRINCIPAL FINDINGS: EXIT INTERVIEWS

RK&A evaluators conducted open-ended interviews with visitors immediately after their visit to *Search for Life* at the New York Hall of Science to gather information about their perceptions, opinions, and understanding of the exhibition. In all, 54 interviews were conducted with 96 visitors—61 adults and 35 children.

Slightly more than one-half of interviewees were male, and slightly less than one-half were female. The median age of adults was 39 years, and the median age of children was 10 years. Slightly more than one-half of the visitor groups included adults and children, and slightly less than one-half were adult only groups.

Of all the visitor groups that were approached and asked to participate in the study, 70 declined to do so, making the refusal rate 56 percent<sup>13</sup>.

### OVERALL REACTIONS TO *SEARCH FOR LIFE*

Overall, interviewees said they enjoyed their visit to *Search for Life*. Most interviewees found the exhibition's design to be hands-on, gratifying, easy to understand, and unique. Several said they liked using many of their senses, including smell, sight, and touch, to explore the exhibits (see the first quotation below). Moreover, all of the adults who visited with children (from toddlers to adolescents) said the hands-on activities kept their children engaged and were educational (see the second quotation).

Touching, actually seeing, [the use of] senses all together [was] different [from other exhibitions]. \*Yeah, sense, smell, touch. All those senses combined in it. [adults]

Having it available for my kids, that's what strikes me. The exhibits are great, very informative for kids. They can learn a lot. Overall, it's good. [adult]

### *Most Interesting Exhibition Aspect*

When asked what they enjoyed most about the exhibition, interviewees named numerous components. About one-half of adult and child interviewees were most interested in the exhibits that illustrated or demonstrated a phenomenon (see the first quotation below). These exhibits included *How Much of You is Water?*, which illustrated the amount of water in a person's body; *Comets Created Our Oceans*, which showed how comets are formed; and *Which is Colder?*, which used touch to demonstrate the temperature difference between two planets. Of these three exhibits, interviewees most often chose *How Much of You is Water?* as their favorite exhibit. They said the exhibit conveyed its message effectively, made an abstract concept concrete, and was surprising in what it revealed (see the second and third quotations). Interviewees liked *Which is Colder?* for similar reasons (see the fourth quotation). Interviewees liked *Comets Created Our Oceans* because they found it unique and fascinating to watch, and one interviewee said the technology was sophisticated, especially compared to exhibits in other museums (see the

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<sup>13</sup> RK&A suspects that this unusually high refusal rate stemmed from the fact that the exhibition's exit was in a busy, noisy thoroughfare, on the way to a preschool area.

fifth quotation). Moreover, though none of these interviewees mentioned it, an explainer was often stationed at Comets Created Our Oceans.

I think it's the fact that you can see it happen as opposed to just looking at pictures and dialogue to explain it. Because kids are picky unfortunately. They've got to experience it because they are not going to take the time to sit and read it. And also, my kids are younger so they're not strong readers yet, so to be able to see it happening is interesting, and they're going to absorb more, they absorb more and they're interested more. They loved it. [adult]

The most interesting exhibit is the one that shows you the volume of water in your body. (What's so interesting about that?) It's one thing to understand it intellectually, but then to see the volume of the water and to realize how important water is actually to everyone, to everything on the Earth, [is another thing]. [adult]

I think the water exhibit is really brilliant. I can read something in a paragraph and not really have a sense of how much water 16 gallons is. It was just beautifully illustrated and really surprising. I had no idea that that much water is in our body. I think the [New York Hall of Science staff] do a great job of taking abstract contents and making it concrete so you can touch it and see it. That's why I like to bring my kids. You're going to absorb something somehow, even if you're not really trying at all. [adult]

I thought it was very interesting. (What was the most interesting part of the exhibition to you?) That Mars is very cold. (That Mars is very cold?) Yeah. (How about you?) \*That Earth is not as cold as Mars. [children]

I was just thinking it was impressive how sophisticated the exhibits were. I've been to other museums where they're simpler. I just think of [the Comets sculpture as] being more sophisticated. [adult]

About one-third of interviewees, especially children, liked the exhibits that immersed them in a unique environment and allowed them to take on a scientist's role. These exhibits included the Mars Rover, Alvin, and the Hubble Telescope. Interviewees liked the Mars Rover and Alvin because they found the activities to be imaginative, realistic, and challenging—driving the rover across the surface of Mars and using grabbers to pick up rocks at the bottom of the ocean (see the quotation below). Those who were most interested in the Hubble Telescope said they have a strong interest in outer space and they enjoyed the opportunity to look at the galaxy and stars.

I think [the one I liked best] was the submarine where you have to pick up the rocks. (Why is that so interesting?) Because it requires coordination, and it is the real thing, not just pictures. [My son] feels like he's really in the submarine. [adult]

Other interviewees named idiosyncratic exhibit preferences. For instance, a few interviewees liked the See Cosmic Rays from Outer Space (formerly known as Cloud Chamber). All of them said they enjoyed learning how the chamber works. Several like the smell exhibits; they said the exhibits were unique and challenged them to guess the smells. One or two interviewees each

named the Life Hunter, the Murchison Meteorite, everything in the Yellowstone exhibit, and the water video as their favorite exhibit.

### *Least Interesting Exhibition Aspect*

About one-third of interviewees said there was not anything they disliked about the exhibition. Of the remaining interviewees, most found fault with exhibits they said were “pointless” or difficult to understand. For instance, about one-third of these did not like Alvin. These interviewees, especially adolescents and adults visiting without children, said the exhibit had no message and was gimmicky (see the first quotation below). Since Alvin was designed to be simple and fun for young children, this is not so surprising. For comparable reasons, another one-third of these interviewees said they did not like the smell exhibits (see the second quotation). Similarly, several interviewees said they did not understand the relevance of See Cosmic Rays from Outer Space (see the third quotation). Several, especially children or those with young children, said they skipped the text panels; a few said they did not like any of the exhibits having to do with outer space since it does not interest them; and a couple said all the information about microbes was boring.

There’s the rock grabbing thing that was just a game, not really terribly interesting.  
[adult]

The one that you smell. (The smell?) Yeah. (Why wasn’t that interesting?) Because it doesn’t have a big meaning behind it. (A big meaning behind it?) Yeah, I couldn’t sit and explain it to my son, he passed by fast. [adult]

Least interesting one? Probably the cloud chamber, the one that illustrates cosmic rays entering the Earth’s atmosphere. (Why? What is not interesting about that?) It’s the least dynamic. It’s one that you can relate to the least. [adult]

### UNDERSTANDING *SEARCH FOR LIFE*

Nearly one-half of interviewees said that the exhibition was about understanding life in extreme places on Earth to help us search for life on other planets. Their understanding reflected an accurate assessment of the exhibition’s main message. This was new and interesting information for these visitors, something many of them said they had never thought about before (see the first and third quotations below). They gave examples from the exhibition, such as Yellowstone and Deep Sea. Several of these interviewees also went on to explain that where scientists find water, we may find life, even on other planets (see the second and third quotations). All the interviewees who understood the main message were adults, and one interviewee explained how difficult it would be for a child to understand it, especially given pop culture’s emphasis on aliens (see the fourth quotation).

[The exhibition is about] all the different life forms that we have on our planet and how there’s a possibility that these life forms can exist on other planets. I just learned about the vents in the ocean. I never knew there were those kinds of things. And now I can understand how maybe there is life on Mars underneath all that ice. It’s something I

never understood before so I think it kind of expanded my world. [adult]

The exhibit puts it out there plainly that you need life, in order for you to have life you need water. I don't know if that's the norm for all the galaxies, but in ours we definitely need it because we know that plants need water. Who's to say what other planets may hold? It might be a little interesting. The microbes living in the mines [were] a surprise. So, on certain planets there might be microbes living deep underground where it's a lot warmer. [adult]

I didn't know that [microbes] live in rocks. But I started reading that they survive on water that seeps down. This is really making sense. I'm embarrassed to admit that I didn't know that. (Well a lot of people don't when they come through really. So it all started to make sense to you somehow?) I started to realize this about water, the stuff about microbes being on Mars, and so that linked back to the outer space exhibit. I thought it ties together very well. [adult]

It's showing the extreme conditions life can operate out of. It's a little less tangible I think when kids or people are thinking about life on other planets, and not exactly thinking microbes. But I think it is a little more exciting to have more alien life forms. I don't think there's any exhibit that sort of brings that out. [adult]

About one-fifth of interviewees, adults and children, said the exhibition primarily showed visitors that water is important to life, though they did not directly discuss the connection of this to searching for life on other planets (see the quotation below). Most seemed to acquire this message from *How Much of You is Water?*

It is about water. (Can you tell me a little bit more about water, like how does water fit into the outer space idea?) Water is very important to Earth because a lot of animals and a lot of living creatures need it, and so do we and other animals. So I think that was interesting. [adult]

In contrast, about one-fifth of interviewees—mostly children—did not give responses related to searching for life on other planets or the importance of water to life. For example, several said the exhibition was about outer space, planets, or astronauts (see the quotations below).

[The exhibition is] about Mars and asteroids and everything. (I'm sorry, what?) And asteroids. And pretty much all about space and how Earth is. [child]

I think the main idea is for them to help kids learn and learn by having fun and by science. (So, what are kids learning about in here?) They can learn all kinds of things about our solar system, about rocket ships, maybe they might want to be a spaceman. [child]

A few other interviewees said they did not know the exhibition's main purpose.

## GROUP EXPERIENCES

Interviewees were asked what kind of group experience they had visiting *Search for Life*. Nearly one-half, all intergenerational, said what they liked about visiting as a group was interacting with their family and watching their children learn and enjoy themselves (see the first and second quotations below). One-fifth, all parents visiting with children, said they did not really interact as a group, rather their children ran ahead and the parents followed. Remaining interviewees gave vague responses and said they had an enjoyable time as a group or that they tended to visit the exhibits as individuals and did not have a group experience.

[The exhibition] got the family all walking around together and communicating, talking, experiencing the different science. [adult]

[I'm here with] my wife and my daughter. It was interesting as a family and also it keeps me involved with what [my children] learn in school and stuff like that. I bring them here so they can learn about science and stuff like that. [adult]

Three-quarters of interviewees said they had some group discussions while visiting *Search for Life*. Many of these said discussions were sparked by exhibits that surprised them, such as Which is Colder?, How Much of You is Water?, Comets Created Our Oceans, See Cosmic Rays from Outer Space, and Mars Rock (see the first and second quotations below). Others said they talked when trying to operate an exhibit or guess what it was, like Life Hunter and the smell exhibits (see the third quotation). A few said they talked at Alvin because it was fun and playful. Other interviewees said they talked the whole way through the exhibition, always about specific exhibits (see the fourth quotation).

Remember the cold thing? So which are the coldest, the Earth or Mars? \*Yeah, that one. (That's something that you talked about?) And we didn't know anything about that. Yeah, we didn't know anything; I thought Mars was pretty hot. [adult and child]

We talked about [Comets Created Our Oceans] a lot because we were waiting for awhile to watch the ice drop, and because my daughter hadn't realized that [comets] were ice and dust. She thought [they were] mostly composed of rock. [adult]

[We talked about] the smells. We were talking about what the smells were. (What were you talking about?) Could we figure out what this is, what does this smell like? [adult]

[We talked about] almost everything. A lot of things actually, the updated spacecraft, the telescope, we talked about that. We talked about the undersea submarine, what they find. We were talking about the comet over there. We talked about the [Life] hunter thing, the water thing [How Much of You is Water?]. Yeah, everything. [adult]

When asked whether they thought they would discuss anything about the exhibition after their visit, most interviewees said they would discuss how fun the exhibition or a particular exhibit was. One interviewee said she would discuss the question of whether there might be life on

other planets given her new understanding of the subject. This woman expressed a prior interest in the topic (see the quotation below).

I'll definitely talk to my father about this. I think the most interesting thing to me is space. I think there are just so many theories and no one has the right answer, so people likely are going to have discussions about that. I would definitely talk more about that at a later time. It's interesting. [adult]

## EXPERIENCES WITH HALL OF SCIENCE EXPLAINERS

One-half of interviewees said they interacted with staff at some point during their visit in *Search for Life*. Of those, about one-half said an explainer helped them understand what an exhibit demonstrated. This happened most often at Comets Created Our Oceans, Which is Colder?, and How Much of You is Water? Another one-half said an explainer showed them how to operate an exhibit, particularly Mars Rover, Life Hunter, the smell exhibits, Hubble Telescope, a microscope, and the Europa puzzle. In all these cases, the explainers enhanced the visitor experience, giving the visitor insight or an experience he or she may not have had otherwise (see the three quotations below).

[Comets Created Our Oceans] was interesting because instead of me figuring it out for myself, she told me about it and we did it together. It would be a lot easier, like if she taught me instead of like me trying to figure it by myself. [child]

One explained how to move that [Mars Rover] around where the rocks were. \*Yeah, yeah. (Was that helpful for you?) Yeah. Because we had no clue what to do. [children]

Somebody helped us with the microscope, and she found a living microbe that we could actually see moving. [When we tried to use the microscope by ourselves] we couldn't see anything on the plate. But she found a living one and it was moving it was very cool. [adult]

All interviewees described explainers as helpful (see the first quotation below), and some interviewees said they were impressed that explainers showed great excitement about the science content (see the second quotation).

Even though [my children] could read [the information], it's better when somebody guides you. (following question directed to child) What do you think about the fact that there were some people that helped us so far? \*Yeah, they were good. They helped us a lot. [adult and child]

[We interacted with staff] all the time. They were coming up to us a lot. \*They were coming up and available. (And how was your interaction with them?) Most of them were great. They seemed to be like as in awe of some of these science things as we were. Their enthusiasm was really incredible. [adults]

## EXPERIENCES AT *WHAT DO YOU THINK?* FEEDBACK BOARD

More than two-thirds of interviewees noticed What do you Think?, a visitor feedback board that invited visitors to respond in writing to two questions about space exploration and searching for life on other planets. Of those interviewees, none wrote a response. About one-half of them said there were no post-it notes to write on. The others said they were not interested in responding. Additionally, of the interviewees who noticed the exhibit, about one-half read at least some of the responses, and of those, about one-half found them interesting. These interviewees said they were surprised at the amount of detail that was written. A couple said it was nice to see children's responses. Other interviewees said many of the responses were nonsensical and so they did not respond to the questions. Of the interviewees who noticed the exhibit but did not read any responses, most said their children were not interested and rushed them away.

**Appendix A**  
**Observation Guide**

**Appendix B**  
**Behavior Definitions**

<b>Coaching</b>	<b>Social interaction</b>
<ul style="list-style-type: none"> <li>- Visitor explains an exhibit or is explained to.</li> <li>- Visitor models how to do or demonstrates exhibit or is shown how to do exhibit.</li> <li>- Visitor reads labels out loud to another visitor or is read to.</li> <li>- Visitor gives verbal instructions or is given verbal instructions.</li> <li>- Visitor asks/answers questions related to the action of the exhibit.</li> <li>- Visitor helps another visitor complete the activity or is helped.</li> </ul>	<ul style="list-style-type: none"> <li>-Verbal interactions related to the exhibit between visitors.</li> <li>-Exclamations between visitor and others, such as “Wow!” “Look at this one.” “Come here.” “This reminds me of . . .”</li> </ul>

**Appendix C**  
**Interview Guide**

**APPENDIX D**  
**Behaviors at Each Exhibit**

**Table 16**  
**Social Interactions**

<b>Exhibit Name</b>	<b># Stopped</b>	<b># Social Interactions</b>
Which is Colder? manipulative/physical interactive	65	35
Comets Created Our Oceans science sculpture	71	31
How Much of You Is Water? manipulative/physical interactive	58	27
Wherever There's Life, There's Water manipulative/physical interactive	46	26
Alvin immersive environment	57	24
Send a Rover All Over manipulative/physical interactive	48	18
Hubbel Space Telescope manipulative	43	17
Speed Comes with Practice manipulative/physical interactive	32	15
Follow the Water artifact	42	15
Watch Rio Tinto Microbes living display	43	14
Life Stinks manipulative/physical interactive	25	14
See Cosmic Rays from Outer Space immersive environment	60	13
Can You Tell If Something's Alive? manipulative/physical interactive	32	12
Can You Smell a Space Rock? manipulative/physical interactive	19	12
Murchison Meteorite artifact	33	12
Touch a Mars Rock artifact	32	11
Water In Motion science sculpture	30	11
It's Hot Down Here manipulative/physical interactive	31	9
What's Under the Ice? manipulative/physical interactive	26	8
Smell the Mud manipulative/physical interactive	29	6
See How Europa's Ice Surface Changed manipulative/physical interactive	20	5
How Can Life Survive? artifact	25	4
Life at the Extremes: Atacama Desert video	31	4
Deep Sea large video	27	4
Life Hunter computer interactive	17	4
What Do You Think? manipulative	19	4
Window On the Universe video	18	4
Life at the Extremes: Deep In a Mine video	16	3
River of Acid Panel graphics	15	3
Will We Find Life On Europa? graphics	8	3
Rio Tinto Means "Tinted River" artifact	15	2
Life at the Extremes: Yellowstone video	15	2
Boiling Mud Panel graphics	5	2
Looking for Signs of Life video	11	2
Thrive Under Ice Panel graphics	6	2
Introductory Panel graphics (2)	3	1
Life on Mars graphics (2)	4	1
Microbes Like It Hot living display	12	1
Mud Teems With Micro-Life living display	7	1
Microbes Support Life at Deep Sea Vents artifact	12	1
Sea Vent Panel graphics	8	1
Is There Life Out There? graphics	2	1
Search Deep Space graphic	3	1
Sunless Mine Panel graphics	16	0
Mine Shafts Lead to Microbes graphics	7	0
See the Mud Flask artifact	13	0
Step Aboard graphics	7	0
Will We Find Life On Titan? graphics	1	0
Methane Ice graphics	4	0
Methane Microbes living display	4	0
Will We Find Life Beyond Our Solar System? graphics	1	0

**Table 17**  
**Coaching nteractions**

<b>Exhibit Name</b>	<b># Stopped</b>	<b># Coaching Interactions</b>
Which is Colder? manipulative/physical interactive	65	33
Comets Created Our Oceans science sculpture	71	32
How Much of You Is Water? manipulative/physical interactive	58	26
Hubbel Space Telescope manipulative/physical interactive	43	19
Alvin immersive environment	57	18
Send a Rover All Over manipulative/physical interactive	48	13
Life Stinks manipulative/physical interactive	25	13
Watch Rio Tinto Microbes living display	43	12
Can You Tell If Something's Alive? manipulative/physical interactive	32	11
Wherever There's Life There's Water manipulative/physical interactive	46	11
Follow the Water artifact	42	11
Speed Comes with Practice manipulative/physical interactive	32	10
Water In Motion science sculpture	30	10
Murchison Meteorite artifact	33	9
See Cosmic Rays from Outer Space immersive environment	60	9
Smell the Mud manipulative/physical interactive	29	8
How Can Life Survive? artifact	25	6
It's Hot Down Here manipulative/physical interactive	31	6
Life Hunter computer interactive	17	6
Touch a Mars Rock artifact	32	5
See How Europa's Ice Surface Changed manipulative/physical interactive	20	5
What's Under the Ice? manipulative/physical interactive	26	4
Life at the Extremes: Atacama Desert video	31	3
Life at the Extremes: Yellowstone video	15	3
Can You Smell a Space Rock? manipulative/physical interactive	19	3
Life at the Extremes: Deep In a Mine video	16	2
Rio Tinto Means "Tinted River" artifact	15	2
See the Mud Flask artifact	13	2
Deep Sea large video	27	2
What Do You Think? manipulative/physical interactive	19	2
Microbes Like It Hot living display	12	1
Methane Microbes living display	4	1
Window On the Universe video	18	1
Mud Teems With Micro-Life living display	7	0
Looking for Signs of Life video	11	0
Microbes Support Life at Deep Sea Vents artifact	12	0

**Table 18  
Watch Videos**

<b>Exhibit Name</b>	<b># Stopped</b>	<b># Watched Video</b>
Life at the Extremes: Atacama Desert video	31	26
Deep Sea large video	27	22
Life at the Extremes: Yellowstone video	15	14
Life at the Extremes: Deep In a Mine video	16	9
Looking for Signs of Life video	11	8

**Table 19  
Use Sensory\* Exhibits**

<b>Exhibit Name</b>	<b># Stopped</b>	<b># Used Sensory</b>
Which is Colder? Manipulative/physical interactive	65	61
Alvin immersive environment (touch only)	57	30
Touch a Mars Rock artifact	32	28
Smell the Mud manipulative/physical interactive	29	21
Life Stinks manipulative/physical interactive	25	18
Can You Smell a Space Rock? manipulative/physical interactive	19	16

*\*Sensory use in this table refers to either touch or smell.*

**Table 20**  
**Use Activity-Based\* Exhibits**

<b>Exhibit Name</b>	<b># Stopped</b>	<b># Used Activity</b>
How Much of You Is Water? manipulative/physical interactive	58	36
Watch Rio Tinto Microbes living display	43	35
Hubbel Space Telescope manipulative/physical interactive	43	31
Alvin immersive environment (used grabber arm only)	57	27
It's Hot Down Here manipulative/physical interactive	31	27
Wherever There's Life There's Water manipulative/physical interactive	46	26
Can You Tell If Something's Alive? manipulative/physical interactive	32	26
Water In Motion science sculpture	30	26
Murchison Meteorite artifact	33	23
Speed Comes with Practice manipulative/physical interactive	32	21
Send a Rover All Over manipulative/physical interactive**	48	18
See How Europa's Ice Surface Changed manipulative/physical interactive	20	16
What's Under the Ice? manipulative/physical interactive	26	15
How Can Life Survive? artifact	25	14
Life Hunter computer interactive	17	8

*\*Activity-based use in this table refers to exhibit-specific activities, including stepping on a scale, using a microscope or magnifying glass, using a grabber arm, turning a knob, flipping a component, and playing a computer game.*

*\*\*To be counted as an activity-based use, visitors had to successfully move the rover.*