The ECLIPSE

April 2015

The Newsletter of the Barnard-Seyfert Astronomical Society

Next Membership Meeting:
April 15, 2015, 7:30 pm
Cumberland Valley
Girl Scout Council Building
4522 Granny White Pike

Topic: *Gary Eaton*
Weird Astronomical Terminology

Details on page 4

In this Issue:

Barnard-Seyfert Astronomical Society

From the President:

Is it Spring yet? Maybe in April we will finally warm up and dry out a bit.

With a little luck, in a few weeks Pickett State Park in East Tennessee will be officially designated as an IDA Dark Sky Park. This is very exciting news! The designation should help that park protect and perhaps even improve their dark skies. The park is very supportive of astronomy, I would encourage everyone to consider spending some time up at the park when the skies are clear and dark. The park is considering making a new section of the park a designated astronomy area. We'll have occasional formal opportunities to support the park, but we look forward to just enjoying a nice dark sky.

Hopefully warmer weather will tempt more of you to come out to star parties! Bring your telescope and share your enthusiasm about the night sky. Please do not worry about needing any special expertise… the past Satuday night I spent most of the night showing the Moon, which is an easy thing for kids to see. But even most adults have a fun "Oh my gosh!" reaction to seeing the familiar Moon up close. We've added a date for Bowie Nature Park since they have been clouded out of most of their dates for the past year, so hope for clear skies on April 10.

April 18th is Earth Day... the BSAS will have a booth at Centennial Park, stop by and say hello! Bring a chair and hang out with us for a while. Weather permitting, we'll be looking at the Sun. April 25th we will enjoy the hospitality of the

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Barnard-Seyfert Astronomical Society

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Observing Highlights April and May

Open Clusters
M36, M37, M38, M35, *NGC2264 (Christmas Tree)*, M41, M50, M47, M46, M93, M48, M44 *(Beehive)*, M67, Mel111 *(Coma Star Cluster)*, NGC4755 *(Jewel Box Cluster)*

Nebulae
NGC1499 *(California)*, M1, M42 *(Orion)*, M43, M78, NGC2392 *(Eskimo)*, NGC3242 *(Ghost of Jupiter)*, M97 *(Owl)*

Multiple Star Systems
Beta Orionis *(Rigel)*, Alpha Geminorum *(Castor)*, Gamma Leonis *(Algieba)*, M40, Gamma Virginis *(Porrima)*, Alpha Canum Venaticorum *(CorCaroli)*, Zeta Ursae Majoris *(Mizar)*

Variable Stars
R Leporis *(Hind's Crimson Star)*, U Orionis, L Puppis, R Leonis

Globular Clusters
M79, M53, M3

Galaxies
M81, M82, NGC3115 *(Spindle Galaxy)*, M95, M96, M105, M108, M65/M66/NGC3628 *(Leo Triplet)*, M109, M98, M99, M106, M61, M100, M84, M85, M86, M49, M87, M88, M91, M89, M90, M58, M68, M104 *(Sombrero Galaxy)*, M59, M60, M94, M64 *(Black-Eye Galaxy)*, M63 *(Sunflower Galaxy)*, M51 *(Whirlpool Galaxy)*, M83

Upcoming Star Parties

Friday 4/10 7:30 - 10:00 pm	Public Star Party Bowie Nature Park (Fairview)
Saturday 4/25 8:30 - 10:00 pm	Public Star Party Edwin Warner Park
Friday 5/8 8:30 - 10:30 pm	Public Star Party Bells Bend Outdoor Center
Saturday 5/16	Private Star Party Natchez Trace Parkway Mile Marker 412 (Water Valley Overlook)
Friday 5/22 8:30 - 10:30 pm	Public Star Party Bowie Nature Park (Fairview)

Happy Birthday Jan Oort
by Robin Byrne

This month, we celebrate the life of a man whose name is synonymous with comets, but whose work encompassed so much more. Jan Hendrik Oort was born on April 28, 1900 in Franeker, Friesland in the northern part of the Netherlands. Oort's father was a psychiatrist who was the director of a sanitarium. The family, including Jan's two brothers and two sisters, lived in the house provided for the director, located in a small forest. This was where Jan spent his childhood.

In 1917, after secondary school, Oort went to Groningen University to major in either physics or astronomy. One of the professors at the university, Jacobus Kapteyn, was instrumental in directing Oort to the field of astronomy. Kapteyn's warm personality and riveting lecture style were the deciding factors. By Oort's Junior year, he was working on research projects with Kapteyn. Oort felt that one of the most valuable lessons he learned from his mentor was the importance of observational evidence to back up your ideas and to avoid speculation.

Upon graduation in 1921, Oort was given a research assistant position at Groningen, but the following year, he went to the United States to work on his graduate degree at Yale University. For two years, Oort worked with Frank Schlesinger in the Yale Observatory, measuring accurate positions of stars. Although it was an area that held little interest for Oort, he gained invaluable experience, plus a masters degree for his efforts. In 1924, when he was offered a position at the Leiden Observatory, Oort jumped at the chance. He continued to work at the observatory until 1970 and was director from 1945 on. In 1926, Oort received his doctorate after writing his dissertation about high velocity stars in the Milky Way. A year later, Oort married Johanna Graadt van Roggen, whom he had met at a university function in Utrecht. They had two sons and a daughter.

Oort's mentor, Kapteyn, had devoted much time to understanding the Milky Way galaxy, especially its structure. His primary technique made use of star counts. Based on this work, Kapteyn estimated our galaxy to be 50,000 lightyears in diameter and 5000 lightyears thick, with the Sun located 2,000 lightyears from the center. Some of the stars, though, didn't seem to fit in due to their high velocities. Kapteyn wrote them off as interlopers. In 1926, Bertil Lindblad developed a model in which these stars were one group of several that orbited around the center of the galaxy. Next came Harlow Shapley, who, by using the distribution of globular clusters, radically changed our image of the galaxy, saying it was a whopping 300,000 lightyears across with the Sun located 65,000 lightyears from the center. However, both Shapley and Lindblad did

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Jan Oort, continued

agree on the direction to the center of the galaxy, which was toward the constellation of Sagittarius. Oort followed all of this very closely, especially the high velocity stars, since that was the topic of his dissertation. What he discovered was that our galaxy does not rotate like a solid body, but, rather, experiences differential rotation, where the stars closer to the center of the galaxy move faster than those farther out. One conclusion he drew from this analysis differed greatly with Lindblad. Lindblad had assumed an even distribution of stars throughout the galaxy. Oort discovered that stars had to be much more densely packed toward the center, creating a concentration of mass, the gravitational pull of which would help account for the motions of the high velocity stars.

Oort's analysis also had a significant difference with Shapley's conclusions about where the Sun is located and the size of the galaxy. Based on the motions of neighboring stars, Oort concluded that we are 30,000 lightyears from the center of the galaxy, which has a diameter closer to 100,000 lightyears across, and that it takes the Sun 225 million years to complete one rotation. In contrast, Shapley had concluded that we are almost twice as far from the center of a galaxy roughly three times larger in diameter. Shapley had failed to include any allowances for the gas and dust between the stars, which would affect his measurements of brightness and color, and therefore, distance. Like most astronomers of the time, it was assumed that the effects would be negligible. In the 1930's. R. J. Trumpler was able to quantify the effects of the interstellar medium on measurements of the brightness and color of stars. Using Trumpler's results to modify Shapley's calculations brought Shapley's and Oort's

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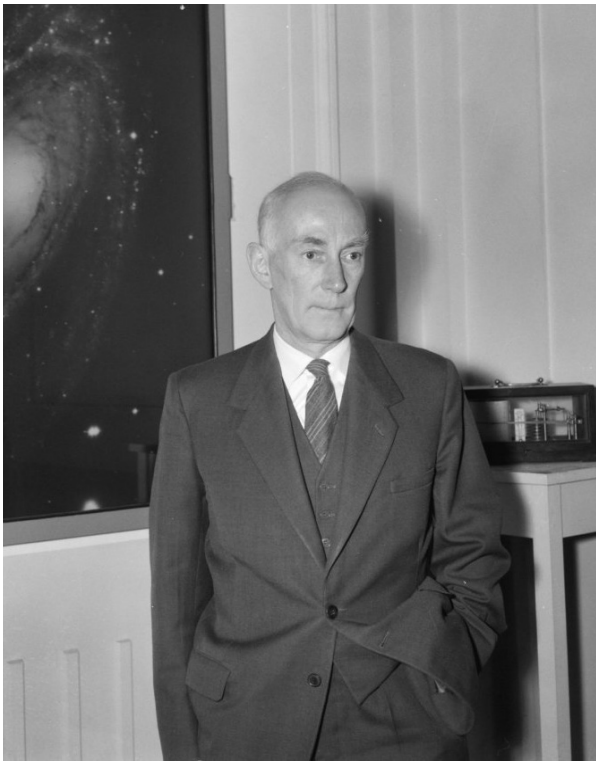
Next BSAS meeting
March 18, 2015, 7:30 pm
Cumberland Valley
Girl Scout Council Building
4522 Granny White Pike

Topic: Gary Eaton is going to have a look at some of the weird terminology used in astronomy. Why do we call them planetary nebulae if they are not actually planets? The history and definitions behind some of the fun words we use.

Jan Oort, continued



measurements within reasonable agreement, confirming Oort's original claims. His studies of star motions also led Oort to discover that close to 90% of the mass of our galaxy, which accounts for how the stars move, is not visible. This was the first piece of evidence for what is now known as dark matter. His work concerning our galaxy was Oort's break into the "big time," garnering him job offers from around the world. However, he was quite content to stay at Leiden.

In 1940 the Netherlands was invaded by the Nazis. By 1942, all Jewish professors had been removed from their teaching positions at the universities. A rousing speech was made upon the dismissal of one of the law professors, which inspired students to go on strike. This was the beginning of the resistance movement in Holland. After most of Oort's colleagues were placed in prisoner camps, Oort chose to leave the university rather than collaborate with the Nazis. He and his family moved to a small town, where Oort focused his efforts on writing a book about stellar dynamics. He also was able to collaborate on some research with American colleagues, most notably on work that helped to prove that the Crab Nebula was the remnant of the supernova explosion widely observed in 1054. Once the war was over, Oort returned to Leiden Observatory and was appointed a position as a full professor.

During the war, Oort had read a paper by Grote Reber discussing what appeared to be radio signals coming from the Milky Way. While most astronomers dismissed this work, Oort was intrigued by the promise of using radio waves to study the galaxy, since they would not be hindered by the gas and dust that plagues visual wavelengths. In 1944, a graduate student, van de Hulst, had told Oort about an essay contest concerning the clumping of particles in interstellar space. Oort, instead, told van de Hulst to work on the possibility of any material in the interstellar medium producing emission or absorption lines in the radio part of the spectrum. Oort's hope was to use the Doppler shift of these lines to map out the location and motion of the gas in our galaxy at distances much greater than is viewable optically. Van de Hulst found that hydrogen should produce an emission line with a wavelength of 21 cm when the electron in the atom experiences a transition from rotating in the same direction as the proton, to rotating in the opposite direction, which is now known as "spin flip."

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Jan Oort, continued

With this promising result, Oort devoted his energies to building radio observatories, helping to establish the Netherlands Foundation for Radio Astronomy. Using salvaged antennas left behind by the Germans, the first observations were made in 1948. Despite their great efforts, the first detection of the 21 cm line did not occur in the Netherlands, but, instead, at Harvard in 1951. Soon, Oort's team detected the signal, as well. Calculations indicated that they were getting signals from distances as far as 25,000 lightyears - much farther than could be seen optically. Ultimately, through his radio work, Oort was able to map out the Milky Way's spiral arms using the distribution of neutral hydrogen clouds, identify the Sun's location on the edge of a spiral arm, and to also conclude that the center of the galaxy is densely packed with stars.

After all of this groundbreaking work concerning our galaxy, Oort took a brief detour into our solar system and the realm of comets. Ironically, this is the work with which his name is most associated. Oort began by studying the motion of long period comets, that is, comets that take over 250 years to complete one orbit of the Sun. Analysis of their motions and orbits indicated that they originated in a region well beyond the orbit of Pluto. He proposed that there must be a vast reservoir consisting of billions of comets at distances of 50,000 - 200,000 astronomical units (roughly 1-3 lightyears) from the Sun. Any nearby passes of stars could easily disrupt the motion of something so far from the Sun's influence, sending it plunging toward the inner solar system, where we would then see it as a comet. Gravitational interactions with the gas giants, especially Jupiter, could eventually alter their orbits to the point where we would see the comet on a regular basis. This vast region of comets is now known as the Oort Cloud.

Even after retirement, Oort remained active with various smaller research projects. From fast moving gas clouds to superclusters of galaxies to the nature of the galactic center to quasars, Oort was curious about it all. It is also fitting that the man who's known for comets would see Halley's Comet on two separate occasions. In 1910, Oort was 10 years old and saw Halley's incredible apparition with his father. Seventy-six years later, he saw Halley's Comet again, this time from an airplane.

Jan Oort died November 5, 1992 in Leiden. Subrahmanyan Chandrasekhar, upon hearing of Oort's death, said, "The great oak of Astronomy has been felled, and we are lost without its shadow."

We have much for which to thank Jan Oort. Because of him, we have a significantly better idea of the structure of our galaxy and our location in it. Radio astronomers can thank Jan Oort for taking seriously the notion that radio waves can be used to study,

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Jan Oort, continued

not only our own galaxy, but other galaxies as well. And, finally, we can remember him for lending his name to a region of our solar system which had never before even been considered to exist. Whether you are gazing at the lovely band of the Milky Way or spotting a comet, take a moment to remember the man who helped us to understand them both, Jan Oort.

References:

Jan Oort - Wikipedia
en.wikipedia.org/wiki/Jan_Oort

Jan Hendrik Oort | biography - Dutch astronomer | Encyclopedia Britannica
www.britannica.com/EBchecked/topic/429497/Jan-Hendrik-Oort

Jan Hendrik Oort Facts, information, pictures | Encyclopedia.com by Robert W. Smith
www.encyclopedia.com/topic/Jan_Hendrik_Oort.aspx

Jan Hendrik Oort: Comet pioneer / ESA history / Welcome to ESA
www.esa.int/About_Us/Welcome_to_ESA/ESA_history/Jan_Hendrik_Oort_Comet_pioneer

From the President, continued

Warner Park Nature Center for Astronomy Day. So we have a lot of opportunities to share our enjoyment of the day and night sky!

Possibly some of you got a new telescope for Christmas... and have not yet had an opportunity to actually use it! With the warmer weather and longer days, it is easier to come early to a star party and set up next to someone who can help. We want everyone to get the most out of their gear. If you have specific questions, please feel free to ask at a general meeting as well.

As always, BSAS is your group... so if there are programs you would like to see, please suggest! Keep up with us on the webpage and on Facebook as well. I hope to see many of you at the next meeting on April 15th.

Clear dark skies,

Theo Wellington

Outreach Opportunities

Blue Moon Wedding: If you would be interested in taking a telescope to a wedding on the night of July 31st (yes,full Moon) we've been asked if anyone is interested in showing the Moon to guests at the reception out in the country east of Murfreesboro. Could be fun!

Bells Bend Outdoor Recreation Festival: A daytime event on Saturday April 11. Bring a solar telescope or just come ready to introduce BSAS to a new group of fans! A fun way to meet people who also enjoy one of our favorite parks and let them know they can find us there at night.

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The Soyuz TMA-14M spacecraft is seen as it lands with Expedition 42 commander Barry Wilmore of NASA, Alexander Samokutyaev of the Russian Federal Space Agency (Roscosmos) and Elena Serova of Roscosmos near the town of Dzhezkazgan, Kazakhstan on Wednesday, March 11, 2015 (Thursday, March 12, Kazakh time). NASA astronaut Wilmore, Russian cosmonauts Samokutyaev and Serova returned to Earth after almost six months onboard the International Space Station where they served as members of the Expedition 41 and 42 crews. The spacecraft touched down safely at approximately 10:07 p.m. EDT. Image Credit: NASA/Bill Ingalls

Outreach Opportunities

Earth Day: Another daytime event on Saturday April 18. Come to Centennial Park ready to observe the Sun or just hang out at our booth. We will have a display on light pollution and information about the upcoming Solar Eclipse.

Tennessee Spring Star Party
From Allen Ball: The Astronomy in the Parks Society, Cumberland Astronomical Society, Dyer Observatory and Fall Creek Falls State Park will be hosting the Tennessee Spring Star Party 2015 on May 15-17 at Fall Creek Falls State Park in Pikeville, Tennessee.

As in the past, TSSP 2015 is free to attend and registration is not required. All are welcome to attend and are responsible for their food and lodging. Fall Creek Falls is offering a star party package for those wishing to stay at the inn. Campsites are also available.

Call 1-800-250-8610 for reservations. Ask for the star party package for rooms at the inn.

There will be all night observing Friday and Saturday night on the observing field (observers are permitted to nap in their vehicles, but camping on the observing field is not permitted)

We will have a hospitality/warming tent on the observing field with warm beverages and snacks provided. There will be public viewing Friday and Saturday nights, 7:00-10:00pm. During the day on Saturday there will be free programs offered in the Cascade Room.

The speakers are being finalized at this time and I'll forward them soon. There will be vendors set up in the lobby at the inn as well as a swap table. We will also offer an introduction to astronomy on Saturday night on the observation field, showing those interested how to use a star wheel and telescope.

Come enjoy a weekend under the stars at one of Tennessee's premier parks. Fall Creek Falls has a family friendly atmosphere with activities offered for all ages.
http://tn.gov/environment/parks/FallCreekFalls/
For more information contact

Lloyd Watkins watkinslk@comcast.net
Allen Ball tnscoper@gmail.com
Thanks and hope to see you in May!
Allen

Barnard-Seyfert Astronomical Society
Minutes of the Monthly Membership Meeting
Held On Wednesday, March 18, 2015.

The Barnard-Seyfert Astronomical Society held its monthly membership meeting for March at the Girl Scouts of Middle Tennessee, 4522 Granny White Pike, Nashville, Tennessee, on Wednesday, March 18, 2015. 17 members and guests signed in. President Theo Wellington called the meeting to order at 7:40 PM.

Theo Wellington asked for a motion to adopt the minutes of the January 21, 2015, membership meeting as published in the February 2015 issue of the Eclipse, the February general meeting having been canceled on account of bad weather. Spencer Buckner so moved, Chuck Schlemm seconded and the minutes were adopted, as published, by unanimous voice vote. Bob Norling reported that there was $1,162.31 in the regular account and $1,724.33 in the equipment account.

It was announced that an astronomical CCD camera had been stolen from a Clarksville amateur astronomer.

Upcoming star parties were announced for March 20-21 at Pickett State Park, Jamestown, TN, March 28 at Shelby Bottoms Nature Center, Nashville, Bowie Nature Park, Fairview, from 7:30 to 10:00 PM on Friday, April 10 (this is an additional date to make up for earlier events that were clouded out), April 11 from 9:00 AM to 3:00 PM at Bells Bend Outdoor Center (this is a solar observing event as part of the 5th annual Nashville Outdoor Recreation Festival and Expo), and April 18 at Centennial Park for Earth Day (solar observing).

Theo Wellington presented a report on the Southwest Astrophotography Forum held November 1-2, 2014, in Tucson, Arizona.

There being no further business the meeting was adjourned at 9:00 PM.

Respectfully submitted,

Bud Hamblen, Secretary

Due to poor weather, there was no BSAS Board Meeting for March 2015.

Barnard-Seyfert Astronomical Society

Become a Member of BSAS! Visit bsasnashville.com to download and print an application for membership.

All memberships have a vote in BSAS elections and other membership votes. Also included are subscriptions to the BSAS and Astronomical League newsletters.

Then fill it out and bring it to the next monthly meeting or mail it along with your first year's membership dues to:

BSAS
P.O. Box 150713
Nashville, TN 37215-0713

Annual dues:

$20 Individual
$30 Family
$15 Senior (+65)
$25 Senior Family (+65)
$12 Student*

* To qualify as a student, you must be enrolled full time in an accredited institution or home schooled.

You can check the status of your membership at bsasnashville.com.

There will be a two month grace period before any member's name is removed from the current distribution list.

About BSAS

Organized in 1928, the Barnard-Seyfert Astronomical Society is an association of amateur and professional astronomers who have joined to share our knowledge and our love of the sky.

The BSAS meets on the third Wednesday of each month at the Cumberland Valley Girl Scout Building at the intersection of Granny White Pike and Harding Place in Nashville. Experienced members or guest speakers talk about some aspect of astronomy or observing. Subjects range from how the universe first formed to how to build your own telescope. The meetings are informal and time is allotted for fellowship. You do not have to be a member to attend the meetings.

Membership entitles you to subscriptions to Astronomy and Sky & Telescope at reduced rates; the club's newsletter, the *Eclipse*, is sent to members monthly. BSAS members also receive membership in the Astronomical League, receiving their quarterly newsletter, the *Reflector*, discounts on all astronomical books, and many other benefits.

In addition to the meetings, BSAS also sponsors many public events, such as star parties and Astronomy Day; we go into the schools on occasion to hold star parties for the children and their parents. Often the public star parties are centered on a special astronomical event, such as a lunar eclipse or a planetary opposition.

Most information about BSAS and our activities may be found at bsasnashville.com. If you need more information, write to us at info@bsasnashville.com or call Theo Wellington at (615) 300-3044.

Free Telescope Offer!

Did someone say free telescope? Yes, you did read that correctly. The BSAS Equipment & Facilities Committee has free telescopes ranging in size from 2.6" to 8" that current members can actually have to use for up to 60 days at a time. We also have some other items in the loaner program such as a photometer, H-alpha solar telescope, educational CDs, tapes, DVDs, and books. Some restrictions apply. A waiting list is applicable in some cases. The BSAS Equipment Committee will not be held responsible for lost sleep or other problems arising from use of this excellent astronomy gear. For information on what equipment is currently available, contact info@bsasnashville.com.

MSRAL 2015

We are excited about the program we have lined up for the Mid-State's 2015 Regional Conference to be held at the University of Arkansas' Little Rock Campus, May 29th – 31st. http://msral2015.caasastro.org/index.php

The conference will begin Friday evening with the traditional CAAS Pisces fry. On Saturday a mix of knowledgeable an inspiring professional and amateur astronomers will present on a broad range of topics, from astrobiology to cataclysmic variables; from tips on organizing and recording your visual observing program at the scope using tablet applications, to tracking asteroids or doing photometry for science; from how to establish a robotic observatory, to a presentation on visual variable star observing, the future of astronomy clubs, and more, all along with a banquet key note on the frontiers of professional/amateur collaboration by Ron Dilulio.

Sunday morning will resume with a compact series on the frontiers of outreach: programs for the blind and disabled, conducting effective star parties in urban settings, launching a Library telescope lending program and planning for the 2017 eclipse.

This will be followed by three parallel workshops: Imaging, CCD Photometry, and a unique club leadership forum aimed at helping club leaders share ideas and problems with the goal of inspiring and empowering club leaders and would be leaders to make our clubs more vital and interesting. Check the website for more and the latest on our program and speakers.

The Arkansas Travelers are in town playing Corpus Christi each day with Sunday's game in the afternoon following the conference. Also of interest to spouses or attendees, the Clinton Presidential Library is an engaging attraction. These and other local attractions will be added to the venue page of the website soon.

Also see the website for on campus dorms, and off campus hotel accommodations. Contact us through the website if you have any questions or observations. Thanks, and hope to see you in May.

METRO PARKS NASHVILLE

APRIL 11, 2015 FROM 9:00AM–3:30PM

BELLS BEND OUTDOOR CENTER

5th ANNUAL

NASHVILLE OUTDOOR RECREATION Festival & Expo

For more information, call 615-862-4187, facebook Bells Bend Park, Follow us on Twitter @NashOutdoor

ACTIVITIES

9:00am	Trail Run sponsored by Nashville Running Company
9:00am	Nashville Zoo animal education
10:15am	Kayak Gear 101, Jackson Kayak
10:30-3pm	Hayrides by the Friends of Bells Bend Park
11:30am	Fly-tying with local expert, Marty Heil
12:45pm	GoPro Basics, Sam Miller
2:00pm	Paddling with Pets
All Day	Food & Beverage available for purchase from the Scottsboro Tractor Club
All Day	TWRA Archery Shoot
All Day	Guided Hikes
All Day	Live Music, coordinated by Austin Valentine

EXHIBITORS

Cumberland Transit – Nashville • USA

Nashville Bicycle Runners

TSRA Tennessee Scenic Rivers Association paddletsra.org

Team Green Adventures.com

Tennessee Ornithological Society 1915

CLIMB Nashville Climbing Fitness Yoga

HOOK1 KayakFishingGear.com

Nashville Running Company

Mountain High Outfitters www.mountainhighoutfitters.com

Neptune Scuba Diving and Snow Ski Professionals

REI www.rei.com

Nashville Paddle Company nashvillepaddle.com

ORVIS

Nashville Hiking Meetup

Sun&Ski

Tennessee Wildlife Resources Agency

SORBA-MidTN sorbamidtn.org

Paddle Up

The North Face Never Stop Exploring

Higher Pursuits

Tread Light Adventure Travel

Denney Fork Outdoors