



Adventures Through Open Minds Science™
(A.T.O.M. Science Club)

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2023 Summer Camp Program

Material Covered in Each Section

June 5-June 16: FREE BONUS WEEKS. We will practice using our microscopes. We will focus on 1) the invention of the microscope, 2) what we are currently able to do with the microscope, and 3) what exciting new microscopes and other optics are being dreamed up and designed for our future.

June 19-July 7 (first section): Summer campers will turn into geologists. We will focus on the geological story of Earth and all its transformations—from a cloud of stardust (known as a nebula), to a lava ball, and then to early Earth, where convection currents resulted in the upwelling of magma that started plate tectonics. We'll see **chemistry in action** while learning about the carbon cycle, hydrothermal vents, weathered sediments neutralizing the acidic ocean, and how the poisonous carbon dioxide that filled the early atmosphere combined with rocks that were transported to the bottom of the ocean through weathering and erosion. By the end of the month, **campers will understand how all this amazing geology and chemistry resulted in Earth becoming the habitable home to life** we know and love today.

To make our geology studies become an exciting reality, we will—with the help of a NASA scientist—explore our own backyards and attempt to find micrometeorites that are currently falling to Earth from outer space! This will give A.T.O.M. Science Club members a hands-on experience of doing what real scientists and explorers do when they go out into the field, hunt for samples, and take what they find back to the lab to examine using their microscopes.

July 10-July 31 (second section): Summer campers will become evolutionary biologists and paleontologists. We will study in depth the characteristics of all life and its evolution and discuss the current hypothesis of how life might have started on early habitable Earth. Watching carefully selected videos, **we will imagine joining paleontologists as they unearth real fossils so we can vicariously experience the thrill of discovery.**

We will then observe how the slowly unfolding story of our evolution has been pieced together, from the most primitive of all cells, LUCA (last universal common ancestor of all life), to fish, amphibians, and reptiles. Like an enormous puzzle or treasure hunt, each unique structure on a bone, chemistry in a rock, or sequence in a species' genome helps us weave together and understand our incredible human evolutionary timeline.

Campers will continue using their microscopes to study both single-celled and multicellular organisms and watch their own tardigrade community flourish. They will need to be scientifically conscious of chemistry (the atoms the tardigrades will be living in) and physics (the correct lighting and temperature for the algae they will grow to feed their tardigrade community). This will help them understand how Earth evolved to provide the correct chemical and physical environment for life to begin and then flourish.

August 1-August 25: (third section) Summer campers will turn into physical anthropologists. We will study mammals with a focus on primates, starting with *tritheledont*—a primitive mammal currently being compared to an advanced reptile—and ending with the *Homo sapiens* of today.

Mammals began to flourish 65 million years ago after dinosaurs became extinct. Watching along online, we will feel the thrill paleontologists and physical anthropologists experience as they unearth bones—such as the partial skeleton of Lucy—that serve as evidence for the most incredible story ever told: the evolution of the human body. We will participate vicariously in a key moment in our evolutionary story when paleontologists discover a bone believed to be the link between our human mammalian skeleton and a reptile’s skeleton.

Then we will join physical anthropologists to uncover evidence of our quadrupedal tree-dwelling ancestors from Africa. We will trace our evolution into bipeds with opposable thumbs who migrated and inhabited the entire planet, using fire and cooking to develop our extraordinary brains, which today have invented technologies that enable us to leave our home planet and potentially inhabit other worlds in our solar system.

Fossil hunting is near and dear to Madame Atom’s heart, since it was part of her work pursuing her college degree in physical anthropology. She has exciting stories to share about digs she went on, artifacts she found, and people she met, including famous scientists like Louis Leakey and Jane Goodall!

Two Special Summer Highlights!

Caring for a Community of Microscopic Animals (Tardigrades)

Many people know and love the water bear, also known as the tardigrade. Campers are thrilled to hear they will get a chance to observe this amazing animal! Using their own tardigrade community and microscopes, campers will gain a clear understanding of how tardigrades eat and digest food and have babies (they have transparent bodies). They will then observe the baby tardigrades grow to maturity. Following the scientific method taught in STEM education, campers will report their observations to each other and

discuss their hypotheses for these observations. This amazing hands-on activity will let campers observe the entire life cycle of an animal—known to be one of the toughest alive—up close, with real scientists as their role models.

Micrometeorite Hunting

Campers will become real scientific explorers as we attempt to find and view, using our microscopes, **stardust**—i.e., micrometeorites that are falling in our own backyards.

Start Dates and Two Free Bonus Weeks

Campers can begin on June 5 because some will be out of school by then. Because some won't be out until later in June, the first two camp weeks will be BONUS weeks focusing on the microscope. If your child does not attend the bonus weeks, they will NOT miss any biology or geology material needed to understand the summer theme. However, these bonus weeks will provide lots of fun learning about amazing inventors and collaborative teams who boldly believed they could invent a machine to help them see in greater detail what they wanted to study—and ultimately succeeded.

Meeting Days

This summer camp has been designed to be taken three days a week. To get the optimal experience students will benefit from taking all three days. While attending once a week will be an enriching addition to the summer, each additional weekly meeting will take your child deeper into that week's topic for greater understanding and an even more enlightening experience. However, if the three-day/week option does not work, you can choose from a once- or twice-a-week option.

Times and Levels

Weekly **meeting times** depend on your child's grade level and are the same on Mondays, Wednesdays, and Fridays.

3:30-5:00pm – Grades 1-5 (elementary)

5:30-7:00pm – Grades 6-12 (middle/high school)

Special Saturday evening activities (see section below)

7:00 pm – All age campers and families

Please feel free to contact me if you are new to A.T.O.M. Science Club or have any questions about this.

Special Saturday Evening Activities

I'm excited to offer two different Saturday evening optional bonus activities—not just for the kids, but for the whole family and for friends. You're invited to join me at 7 p.m. on Saturdays to welcome special guest lecturers related to the weekly topics or get out your popcorn maker and pull up a comfy chair for Movie Night.

Our understanding of Earth's place in the Universe and of the various materials that space has available for delivery to Earth is greatly enhanced by world-class research facilities like the University of California's Lick Observatory atop the Bay Area's Mount Hamilton. One of the many guests I have lined up is Lick Observatory telescope operator, Rick Baldrige, who will meet with campers to describe the observatory's telescopes, the research conducted and discoveries made there, and the observatory's rich scientific history. Also joining us will be Brian Day, a space scientist at NASA's Solar System Exploration Research Virtual Institute, who is working on the current mission to the Moon. I will add more names as I receive confirmations from guest speakers I am inviting.

Good News for Families Planning Vacations

I will be recording selected summer camp club meetings held over Zoom. **YOUR CHILD WILL BE SEEN AND/OR HEARD IN THESE ZOOM RECORDINGS.** The recordings will be used only so your child can catch up with missed club meetings. These club meeting recordings will be available until September 9, 2023, which is three weeks after the date of the final camp session. At least two weeks notice via email is required for all recording requests, which are granted only in special circumstances. Recordings will be shared (password protected) only with the requesting family(ies). On the rare occasion that I might record, if you do not wish your child's image to appear in the video, you are free to have them turn their camera off during the meeting.

If a student has to miss a class due to vacation, you must call me (650-271-2035) to discuss options, one of which is to receive a recording of the meeting.

Benefits of the 2023 A.T.O.M. Science Club Summer Camp Experience

When you sign up for the 2023 summer camp season, you will get:

- **10 weeks** filled with **extraordinary science adventures**
- **2 FREE BONUS WEEKS** for all who sign up before summer camp starts
- Saturday **special movie night** or **guest lecture**
- **20% savings** on the 3-days/week summer option over the 1-day/week option
- New this year: **vacation accommodations**

Pricing and Materials

For 12 weeks, June 5-August 18 (**includes two bonus weeks** described above in Benefits!)

Monday Only - \$500

Monday/Wednesday - \$900 (10% off single-day-a-week price)

Monday/Wednesday/Friday - \$1,200 (20% off single-day-a-week price)

SIGN UP BEFORE APRIL 15 for an additional 5% DISCOUNT! (\$475 / \$855 / \$1,140)

Financial assistance is available based on need. Students will **never** be turned away simply because they cannot afford a class. Please reach out for any needs-based concerns so we can make sure your child can afford to attend.

There will be an additional material/supplies cost for this summer camp, which will cover the cost of

- 1) a digital microscope
- 2) scientific equipment
- 3) living organisms (the tardigrades, their food, and growth media for the food)

I am currently selecting a microscope and will let families know the cost shortly. **Please wait for my recommendation before purchasing a microscope.** I am also looking into a specially discounted rate for the summer camp materials so please wait to purchase anything for this summer camp.

Signups Open Now!

You [can sign up to reserve your spot](#) and pay for the session you choose on the Corsizio course platform. If you have other special requests like forming your own group or this schedule doesn't work for you, please contact me.

Thank you so very much for being a part of A.T.O.M. Science Club's Summer Camp 2023. I can't wait for our exciting summer of science exploration!

Enthusiastically,

Madame Atom

Leslie Herleikson

aka Madame Atom

Founder, Director, and Educator of **A**dventures **T**hrough **O**pen **M**inds **S**cience Club

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