Plan and Purpose: Rain & The Water Cycle

YSO, 2 Iyyar 5785, Oraysa

The water cycle, also known as the hydrologic cycle, is the continuous **directed** movement of water on, above, and below the surface of the Earth. This cycle has no beginning or end and involves water in all its forms: liquid (rivers, lakes, oceans), solid (ice, snow), and gas (water vapor in the atmosphere).

Taanis 9b

תַּנְיָא, רַבִּי אֱלִיעֶזֶר אוֹמֵר: כָּל הָעוֹלָם כּוּלּוֹ מִמֵּימֵי אוֹקְיָינוֹס הוּא שׁוֹתֶה, שֶׁנֶּאֱמַר: ״וְאֵד יַעֲלֶה מִן הָאָרֶץ וְהִשְׁקָה אֶת כָּל פְּנֵי הָאֲדָמָה״. אָמַר לוֹ רַבִּי יְהוֹשֻׁעַ: וַהֲלֹא מֵימֵי אוֹקְיָינוֹס מְלוּחִין הֵן! אָמַר לוֹ: מִתְמַתְּקִין בֶּעָבִים.

The Gemara discusses the source of rain. It **is taught** in a *baraisa* **that Rabbi Eliezer says: The entire world drinks from the waters of the ocean ** i.e., evaporated ocean water is the source of rain. **As it is stated: "And there went up a mist from the earth and watered the whole face of the ground"** (Genesis 2:6). **Rabbi Yehoshua said to him: But the waters of the ocean are salty,** whereas rainwater is sweet. Rabbi Eliezer **said to** Rabbi Yehoshua: The waters **are sweetened in the clouds,** before they fall to the earth. ...

שֶׁנֶּאֱמַר: ״עֹשֶׂה גְדֹלוֹת וְאֵין חֵקֶר״, וּכְתִיב: ״הַנּוֹתֵן מָטָר עַל פְּנֵי אָרֶץ״, וּכְתִיב לְהַלָּן: ״הֲלוֹא יָדַעְתָּ אִם לֹא שָׁמַעְתָּ אֱלֹהֵי עוֹלָם ה׳ אֵין חֵקֶר לִתְבוּנָתוֹ״, וּכְתִיב: ״מֵכִין הָרִים בְּכֹחוֹ וְגוֹ׳״.

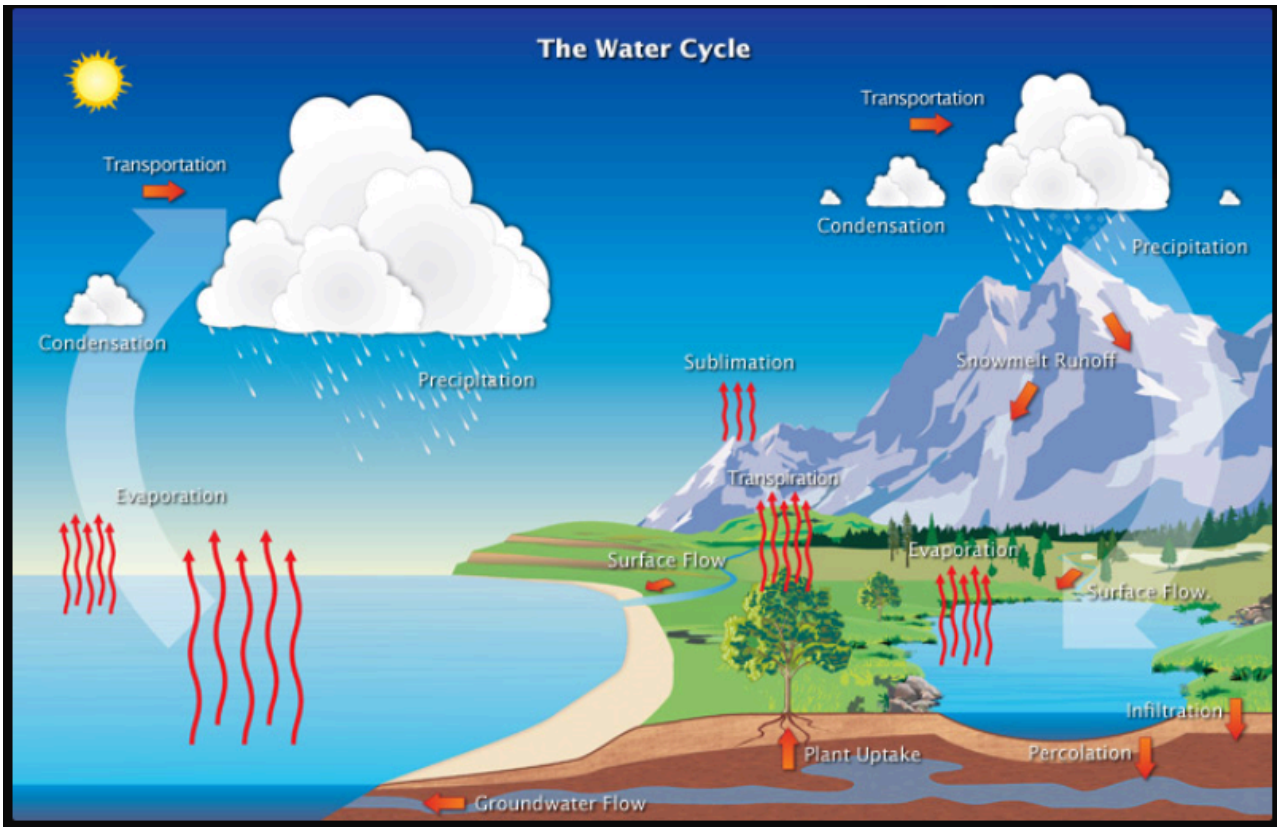
As it is stated, with regard to the creation of the world: **"Who does great things past finding out"** (Job 9:10), **and** as an example of this **it is written: "Who gives rain upon the earth"** (Job 5:9–10). **And it is written below: "Have you not known? Have you not heard that the everlasting G-d, the Lord,** the Creator of the ends of the earth, does not faint and is not weary; **His discernment is past finding out"** (Isaiah 40:28). The repetition of "past finding out" indicates that rainfall is as wondrous as the creation of the world. The Gemara adds: **And it is written** in a psalm that deals with rainfall: **"Who by Your strength sets fast the mountains;** Who is girded about with might" (Psalms 65:7).

The remarkable thing about **water** is the interlocking qualities of its unusual chemistry, and how that makes it ideally suited for the many roles it plays in making life on Earth possible. It is a "universal solvent," with just the right viscosity for the circulatory system, with its vital ability to

effect body cooling by evaporation, and on and on. No creature benefits more from these qualities than humans do. Let that sink in. What about the fact that frozen water floats rather than sinks? Life as we know it would be impossible otherwise. On a planetary level, it drives the tectonic and water cycles, those “two great cogs that work together,” as Michael Denton puts it [see below]. All a lucky coincidence, you say?

No. The many diverse capacities of water need not have been as they are. That these are all brought together just so provides among the most powerful pointers to intelligent design.

- **Oceans**: Hold about 97% of Earth's water, are the main source of evaporation, and receive most of the precipitation.
- **Rivers**: Transport precipitation runoff from land back to the oceans, completing the cycle.
- **Rain**: Is the most common form of precipitation, returning water from the atmosphere to the surface.



The Water Cycle

1. **Evaporation:**

   The Sun heats water in oceans, rivers, and lakes, causing it to change from liquid into

water vapor-a process called **evaporation**. This water vapor rises into the air and begins to cool.

2. **Cloud Formation:**

   As the water vapor cools, it condenses into tiny droplets that group together to form **clouds**.

3. **Wind Movement:**

   The wind blows these clouds from the ocean towards the land.

4. **Precipitation:**

   When the droplets in the clouds become heavy enough, they fall to the ground as **rain** (or sometimes snow, sleet, or hail). The rain waters trees, crops, and other plants, supporting life on land.

5. **Runoff and Collection:**

   The rainwater flows over the ground and collects in rivers and streams, which carry it back to the ocean. This intelligently designed cycle then continues again.

A Mechanism for Filtering the Salt

Clouds filter out the salt from seawater through the process of evaporation. When the Sun heats the ocean, **only the water molecules evaporate and rise into the atmosphere,** leaving the dissolved salts and other minerals behind in the sea.

Salt, which is sodium chloride (NaCl), has a higher density and a vastly higher boiling point than water. Crystalline NaCl's density is ~2.16 g/cm³, compared to water's ~1.00 g/cm³ at 25°C, though density plays a role in its behavior. NaCl is a non-volatile ionic compound, meaning it does not easily vaporize due to its crystalline lattice of Na^+ and Cl^- ions held by strong ionic bonds, resulting in a boiling point of ~1465°C, far above natural temperatures and that of pure water (100°C). As a result, when seawater evaporates in the water cycle's elegant process, only water molecules transition into vapour, leaving solid NaCl (salt) and other minerals behind. This direct separation ensures clouds form from fresh water, and rainfall is not salty.

The water cycle's elegant evaporation occurs at the surface, where water molecules, energized by heat (often sunlight), break hydrogen bonds between neighboring water molecules (H_2O) and escape as vapour, well below water's boiling point of 100°C at sea level. Water's extraordinary properties—high heat capacity, high surface tension, and low viscosity—enable this selective

escape. By contrast, NaCl's ionic lattice requires immense energy to break, ensuring it remains as solid salt during evaporation. This precise separation, yielding fresh rainfall, reveals a purposeful design, as water's unique properties align perfectly with ecological and human requirements.

This natural distillation, a triumph of physical chemistry, demonstrates a purposeful design in the water cycle's ability to provide fresh water. Water's thermal stability, solvent capacity, phase behavior, density maximum at 4°C, and ice's buoyancy drive technologies like thermal distillation and reverse osmosis, used by countries like Israel to convert seawater into potable water. These systems harness the same wonders of creation that enable nature's cycles to meet the needs of man.

The water cycle is essential for replenishing freshwater supplies, supporting plant and animal life, shaping Earth's surface, and regulating the climate through the exchange of heat during evaporation and condensation. The water cycle is a never-ending **directed** process powered by the Sun, moving water from the oceans into the atmosphere (evaporation), forming clouds (condensation), returning it to the surface as rain (precipitation), and channeling it back to the oceans via rivers and runoff-repeating the process endlessly.

Fomation of Clouds

Clouds are visible clusters of tiny water droplets or ice crystals suspended in the atmosphere. They form when **water vapor**—an invisible gas—cools and condenses onto microscopic particles such as dust, pollen, or salt, known as **condensation nuclei**. This condensation occurs as rising moist air cools to its **dew point**—the temperature at which air becomes saturated and can no longer hold all its water vapor—causing the excess to condense into droplets or ice crystals.

Rain develops when these droplets grow large enough to fall, typically by one of two processes. In warmer clouds (above freezing), droplets collide and merge (coalescence), gradually becoming heavy enough to overcome air resistance and fall as rain. In colder clouds (below freezing), **ice crystals** grow by absorbing moisture from surrounding **supercooled water droplets**. These crystals may melt into raindrops as they fall through warmer air or remain frozen and reach the ground as snow or hail. In either case, **precipitation**—any form of water, liquid or solid, that falls from clouds and reaches the ground—occurs when particles become too heavy for updrafts to support, and gravity pulls them earthward.

The Majority of the Human Body consists of Water

What do we need to survive? Air? Water? Food? Water (liquid H~2~O) is of major importance to all living things; in some organisms, up to 90% of their body weight comes from water. About 60% of the human adult body is water.

According to Mitchell and others (1945), the brain and heart are composed of 73% water, and the lungs are about 83% water. The skin contains 64% water, muscles and kidneys are 79%, and even the bones are watery: 31%.

Each day humans must consume a certain amount of water to survive. Generally, an adult male needs about 3 liters (3.2 quarts) per day while an adult female needs about 2.2 liters (2.3 quarts) per day. All of the water a person needs does not have to come from drinking liquids, as some of this water is contained in the food we eat.

Water serves a number of essential functions to keep us all going

- A vital nutrient to the life of every cell, acts first as a building material.
- It regulates our internal body temperature by sweating and respiration
- The carbohydrates and proteins that our bodies use as food are metabolized and transported by water in the bloodstream;
- It assists in flushing waste mainly through urination
- acts as a shock absorber for brain, spinal cord, and fetus
- forms saliva
- lubricates joints

The unique qualities and proerties of water such as its density, heat capacity, surface tension make it into a universal solvent so important and basic to life. The cells in our bodies are full of water. The excellent ability of water to dissolve so many substances allows our cells to use valuable nutrients, minerals, and chemicals in biological processes. Water's "stickiness" (surface tesnion) plays a part in our body's ability to transport these materials all through ourselves. The carbohydrates and proteins that our bodies use as food are metabolized and transported by water in the bloodstream. No less important is the ability of water to transport waste material out of our bodies.

Nature's Destiny, Michael Denton

> In this exciting book, Michael Denton details science's relentless progress toward an unexpected conclusion-that the universe was intentionally designed for human beings. From the laws of physics to chemistry to biology, from the properties of water to the characteristics of fire, he shows the goal of the cosmos to be human life. The scientific and theological consequences of this study are immense. MICHAEL BEHE, AUTHOR OF

> DARWIN'S BLACK BOX

Michael Denton is a Senior Fellow at the Discover Institute's Center for Science and Culture. He earned a Ph.D. in biochemistry from King's College and is the author of multiple books, including *Evolution: A Theory in Crisis.*

In *Nature's Destiny,* Michael Denton marshals a stunning range of biological, chemical, and physical evidence to answer systematically a simple question: Could life elsewhere in the universe be significantly different from life on Earth? Must it rely on carbon, water, DNA, amino acids, and proteins? Could there be an alternative to DNA, or could DNA be constructed out of different components?

Life is highly constrained by the laws of nature. If, for example, the ratio between strong and weak chemical bonds had not been precisely what it is, **if the thermal properties of water were not precisely what they are**, if the atmosphere of the Earth had not had just the right properties to filter out harmful radiation, then a flourishing biosphere such as exists on Earth would be impossible.

The following is a quote from the Preface: (Free Press, 2002).

> The aim of this book is, first, to present the scientific evidence for believing that the cosmos is uniquely fit for life as it exists on earth and for organisms of design and biology very similar to our own species, Homo sapiens, and second, to argue that this "unique fitness" of the laws of nature for life is entirely consistent with the older teleological religious concept of the cosmos as a specially designed whole, with life and mankind as its primary goal and purpose.
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> Although this is obviously a book with many theological implications, my initial intention was not specifically to develop an argument for design; however, as I researched more deeply into the topic and as the manuscript went through successive drafts, it became increasingly clear that the laws of nature were fine-tuned for life on earth to a remarkable degree and that the emerging picture provided powerful and self-evident support for the traditional anthropocentric teleological view of the cosmos. Thus, by the time the final draft was finished, the book had become in effect an essay in natural thcology in the spirit and tradition of William Paley's Natural Theology or the Bridgewater Treatises.
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> The basic thesis of the book, **that the cosmos is uniquely fit for human existence**, is of course not novel. For centuries before the birth of modern science, this thesis was one of the foundational axioms of medieval Christianity. More recently, it has begun to reemerge in various fields of science, most notably in physics and cosmology. Readers familiar with the views of physicists such as Freeman Dyson, Fred Hoyle, and Paul Davies will be

aware that over the past few decades many physicists have pointed out that the existence of life in the cosmos is critically dependent on the laws and constants of physics having the precise values they do. The values are so critical that several well-known authors have argued that the cosmos gives every appearance of having been very finely adjusted or "prefabricated" for our existence.' As Paul Davies points out in his Accidental Universe: "If nature had opted for a slightly different set of numbers, the world would be a very different place. Probably we would not be here to see it." In his words: "The impression of design is overwhelming." Because of the perceived support for the traditional teleological worldview of the major religious traditions, the views of Davies and others have received wide publicity. ...

Contrary to Davies and others, I believe the evidence strongly suggests that the cosmos is uniquely fit for only one cype of biology —that which exists on earth-and that the phenomenon of life cannot be instantiated in any other exotic chemistry or class of material forms. Even more radically, I believe that there is a considerable amount of evidence for believing that the cosmos is uniquely fit for only one type of advanced intelligent life-beings of design and biology very similar to our own species, Homo sapiens.

I do not agree with Davies when he claims, "The physical species Homo sapiens may count for nothing. To defend the postulate that the cosmos is specifically fit for biological life as it exists on earth necessarily involves consideration of a vast number of natural laws, phenomena, and processes which are quite outside of the areas of physics and cosmology and pertain uniquely to the biological realm, phenomena such as the thermal properties of water, the characteristics of the carbon arom, the solubility of carbon dioxide, the self-assembling properties of proteins, the nature of the cell, and so forth. Although from the evidence of physics we may be able to infer that the cosmos is uniquely fit for chemistry, stars and planets, or even intelligent beings, we cannot infer that it is specifically fit for large, air-breathing terrestrial mammals. Only through biology can our unique type of carbon-based life and especially advanced forms like ourselves lay claim to a central place in the cosmic scheme.

This book is divided into two major parts. In Part 1, evidence is presented that the laws of nature are uniquely fit for the being or existence of the type of carbon-based life that exists on earth. The chapters in this section deal with evidence drawn from many areas of the biological sciences, from molecular biology to mammalian physiology. The physical and chemical properties of the fundamental constituents of the cell, such as water, carbon dioxide, the bicarbonate buffer, oxygen, DNA, proteins, the transitional metals, the cell membrane, etc., are systematically reviewed to show that the existence of carbon- and water-based cellular life depends critically on a number of remarkable adaptations in the propertics of many of life's basic constituents.

> What is particularly striking is that, in almost every case, each constituent appears to be the only available or unique candidate for its particular biological role and, further, gives every appearance of being ideally fit not in one or two but in all its physical and chemical characteristics. Also reviewed is evidence drawn from other areas of science that attests to the fitness of the earth's hydrosphere, the fitness of the electromagnetic radiation of the sun, and the fitness of the periodic table for the carbon-based type of life as it exists on earth. As the book also shows, the existence of some higher forms of life, such as large warm-blooded, air-breathing terrestrial vertebrates, are critically dependent on the properties of some of the basic constituents of life, **such as water**, carbon dioxide, and oxygen; in other words, not only are the laws of nature fit for the cell and for simple microbial life, but also for advanced complex organisms very like ourselves. ...
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> Another final point that perhaps should be clarified here at the outset is that I am using the term "anthropocentric" throughout the text in the generic sense. The cosmic "telos" I have in mind is advanced carbon-based humanlike or humanoid life. It is not specifically our own unique species Homo sapiens. At present, there is insufficient evidence to argue that the laws of nature are uniquely fit for every detail of human biology exactly as found in our own species today. However, I believe that the current evidence points strongly in this direction and that future scientific advances will confirm the absolute centrality of mankind in the cosmic scheme.
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> In the last analysis, the **teleological perspective** [plan and purpose] presented and defended here is good for science, because it renders scientific knowledge relevant to human existence. In the doctrine of final causation, science unites man and cosmos. The pursuit of scientific knowledge becomes no longer of merely practical value but also vital and central to the spiritual and intellectual life of man. —Michael J. Denton Dunedin, November 1996

Water Points to Intelligent Design of Life

Water, covering nearly three-quarters of Earth’s surface, is fundamental to life as we know it. It functions as a **universal solvent**, dissolving a vast range of chemical compounds vital to biological systems, including salts, nutrients, and gases. Unlike highly reactive solvents such as sulfuric acid, which may destroy molecular structures upon contact, water facilitates chemical transport and reactions without degrading the compounds it carries. This balance makes it ideal for sustaining delicate **biochemical processes**, including those involving proteins, nucleic acids, and enzymatic pathways.

Water’s **low viscosity** plays a critical role in the structural integrity of life at the microscopic

level. Intracellular organelles and macromolecular assemblies, including **DNA, RNA, and protein complexes**, rely on water's fluidity to maintain configuration and function. If water were significantly less viscous, as with liquid hydrogen, cell membranes and molecular scaffolding would be unstable against mechanical perturbation. Conversely, a slightly more viscous fluid would hinder diffusion and obstruct circulatory functions such as capillary blood flow, thereby limiting the distribution of oxygen, glucose, and signaling molecules—processes essential for **multicellular life**.

Among water's most life-enabling features are its **thermal properties**. It has a high **specific heat capacity**, meaning it can absorb or release large amounts of heat with minimal temperature change. This characteristic buffers living organisms and ecosystems against thermal fluctuations. Many **biochemical reactions**, including DNA replication and protein synthesis, are **temperature-sensitive** and require strict regulation. Water helps maintain the thermal homeostasis needed for these reactions to proceed. The **evaporative cooling capacity** of water—among the highest known—further stabilizes body temperature in organisms like humans. As water evaporates from the skin, it draws out heat, enabling thermoregulation even when ambient temperatures exceed body temperature. This mechanism is particularly efficient in humans, whose relatively hairless bodies are optimized for cooling via **perspiration**.

Water's behavior during **freezing** is another key anomaly. While most liquids contract and become denser as they solidify, water expands, causing ice to float. This property insulates underlying liquid water, preventing lakes and oceans from freezing solid and thereby preserving aquatic ecosystems. Without this feature, large bodies of water would freeze from the bottom up, rendering them uninhabitable and interrupting nutrient and oxygen exchange necessary for aquatic life.

Finally, water interacts dynamically with Earth's **tectonic cycle** brings essential elements to the surface through volcanic and plate activity. These materials are then dissolved by water in the **hydrologic cycle**, transported across environments, and eventually deposited into oceans. There, tectonic activity recycles them again. This **coupling of chemical and mechanical processes** maintains a long-term balance in Earth's biosphere, continuously renewing the mineral and chemical inputs that sustain DNA replication, cell metabolism, and global ecological networks.[1]

Singing in the Rain

Rav Avigdor Miller, Passionate Prayers. torasavigdor.org.

On **Shemini Atzeres** when the *chazan* stands up at the front of the *shul* to say the special prayer for rain, in some places he sheds tears. Yes, I've seen that. In better places, he's crying

as he's begging for rain.

Now, it could be that all of those tears are genuine – I imagine they are. And yet I'm suspicious that he's thinking not only about rain. Maybe he's thinking about *parnassah*, good health, yes. Other things that we sometimes include in the *tefillas hageshem,* yes. But rain itself? He's *davening* for a rainy day? I'm not convinced. But the truth is that it's all prayers for rain. And we go all out for it! On Hoshana Rabbah we see, the *chazan* stands up – he even wears his *kittel* – and he's praying plaintively, הוֹשַׁעְנָא, הוֹשַׁעְנָא! He's crying out, אָנָּא הוֹשִׁיעָה נָא הוֹשַׁעְנָא! Please save us, Hashem! He's talking about rain; that's the theme of the day.

Even the mysterious custom that the *nevi'im* instituted of striking the ground with the *aravos*, that's also for rain. It's a form of praying for rain! People have no idea what's taking place! They're thinking about everything else except for the most important thing. So much time we're walking around the *bimah* and saying words, only that we don't begin to know what we're talking about. That's why it happens that the same person who *davened* all morning, as soon as he finishes *davening* he walks out of the *shul* and he sees that it's raining and he says, "What a nasty day!"

Now, isn't it a shame that we see drops of *daas* (understanding) all winter long and yet we're not learning the lessons they're trying to teach us? And that's why when the great opportunity that comes along every year at the end of Sukkos, when we start saying again the words "מַשִּׁיב הָרוּחַ וּמוֹרִיד הַגֶּשֶׁם" in our *shemoneh esrei*, we should make sure to think about what we're saying.

Now, the *frum* Jew, he becomes a bit apprehensive because he's afraid he might skip it; he might skip those four words and then he's going to have to repeat the *shemoneh esrei*. There are even some Jews who the first thirty days they put a pencil in their *siddur*, or a key or something else to mark the place, as a reminder they shouldn't skip. They're worried about it, and rightly so.

But it's a pity to say the words and skip the meaning; even if it's not raining outside — there will be a lot of beautiful sunny days in the winter — when we say those words it's an opportunity to acquire some of that *daas* we were speaking about before; it means you have to think about these words, "You cause the wind to blow and the rain to come down."

The Grand Architect

In English we say, "It's raining." What does that mean "It's raining"? It doesn't rain by itself! Even in Yiddish, you hear a good Jew say, "*Ess regent.*" *Es regent gornisht!* The wind too. Here a frum man is walking down the street and a wind blows in his face and he says "*A vint blozt.*" "A wind blows"?! Winds don't blow on their own.

מַשִׁיב הָרוּחַ וּמוֹרִיד הַגֶּשֶׁם means *He* blows the wind and *He* brings down the rain. Hashem is the one doing it. In *lashon hakodesh* it doesn't rain and it's not windy. That's in *goyish*. In the Torah language, *He* blows the wind and *He* makes it rain.

Now, it doesn't only mean He sends rain down. It's much more complicated than that. Rain is a phenomenon that requires the participation of many forces of "nature." Before those precious drops finally come down, there is a great deal of wire-pulling on the part of the great Designer and Architect who stands behind the scenes.

The Giant Conveyor Belt

First of all, before the rain can fall down, it has to come up. It had to get up there some way. How did that happen?

So we understand that the sun was busy pumping by means of evaporation. The sun is pouring millions of tons of energy every day — I should say every minute — onto the surface of the earth and to a very big extent that energy is used up in the work of evaporating water from the surface of the oceans. Tremendous masses of water, millions of tons of water daily, rise up from the surface of the earth in the form of vapor and become clouds.

Now, that's nothing yet because what good are the clouds when they're suspended over the ocean? Most clouds form over the ocean from where they originated but what good is it if it will rain down in the ocean again? Nobody is going to plant in the ocean. It's the continents that need the rain.

And so before *morid ha'geshem,* first Hashem is *mashiv ruchos.* The winds are called in by the Borei Olam. עוֹשֶׂה מַלְאָכָיו רוּחוֹת – *Hashem makes the winds into His messengers* (Tehillim 104:4), and the wind begins to blow these masses of water vapor and the clouds are blown inland over the continents.

It's a remarkable miracle! There are special breezes, special winds, that are always blowing inland from the ocean. And like a huge conveyor belt they take these tremendous masses of vapor that hover over the ocean and they blow them inland over the continents. And instead of uselessly falling into the oceans, the rain falls instead onto fields where it turns into apples and pears and pineapples and bananas and oranges and all good things.

Mystery of Gravity

Because what does Hakodosh Boruch Hu do after מַשִׁיב הָרוּחַ, after the clouds are blown over Nebraska and South Dakota? Then He's מוֹרִיד הַגֶּשֶׁם. The water becomes heavier again; it condenses and it begins coming down.

But why should it come down? Why can't the water fall towards the moon or it should fall towards the sun? Why does it fall towards the earth? So this every child knows; it's the force of gravity. It's a certain force that everybody speaks about, but nobody understands – even the greatest savants don't know what that is. They can tell you mathematically how the force of gravity is expected to work according to the mass and according to the distance and so on, but what is the force of gravity and why it works that way, nobody knows.

It's a mystery; a mysterious miracle. Hakodosh Boruch Hu made the water become heavy and by the force of gravity it comes down. And what you see now is the miracle of gravity pulling the water down to the earth for our benefit.

Thirsty Sailors

But actually we're just beginning the subject because how can that salty ocean water be a benefit to us? You know when the water was in the oceans, it wasn't clean. Sailors have died from thirst while surrounded by seawater. Sea water is not potable. You can't drink ocean water.

But when it rains, all of this seawater comes down pure in the form of clean rain. How did that happen? When it evaporates, doesn't a salty taste go along with it?

The answer is, it went through a distillery. When the sun evaporates the ocean water it distills it and the water vapor doesn't take along any impurities; all the impurities were left down here and only pure water vapor goes up into the clouds.

And that pure water vapor, as clean as it was *b'sheishes yemei bereishis*, or almost, comes down again for a new cycle of pure water, to give life to the earth.

Environmental Recycling

It's important to consider that when you look at the rain. This rain coming down now is the same rain that came down at the beginning of *maaseh bereishis*. When the world began, this rain, the same rain came down.

It's been coming down again and again, only it's been recycled. It's the same clean water that our forefathers drank, that's the plain truth – you're drinking second-hand rain. A lot of the water was already in the bodies of animals and humans and was urinated out again. All the runoff water, dirty water, makes its way down the mountains and rivers and streams and it goes back into the sea. Water that was in the carcasses of animals that died, water was in decaying plants, and eventually it all made its way to the ocean. Billions of gallons of sewage are emptied into the oceans every day.

Don't worry about it though; it tastes just as good. Mr. Shelby reminded me of that. As he was

driving me here tonight he remarked, “Just as good as it was in Avraham Avinu’s time.” He’s right – it’s the same taste. But more than that, it’s the same water! We’re drinking second-hand rain. That’s the truth. Only it’s purified. It’s one of the great *nissim* of Olam Hazeh. The world is a wonderful machine of cycling, recycling.

A Puzzling Gemara

And so when we come to the prayers for rain on Hoshana Rabah and Shemini Atzeres and all winter long when we say מַשִּׁיב הָרוּחַ וּמוֹרִיד הַגֶּשֶׁם and וְתֵן טַל וּמָטָר – whenever it rains too – let’s keep in mind we are marveling at the first and the greatest recycling process, the rain cycle that keeps the world sustained. It’s foolproof. It’s going to continue until Hakodosh Boruch Hu says stop. And that’s one of the great features of מוֹרִיד הַגֶּשֶׁם.

I want to talk now about another feature of *geshem* (rain), something that’s included in the gift of rain but a little more hidden from the eyes.

In Mesichta Kesubos (10b), the Gemara enumerates the benefits of rain and one of the benefits is stated as follows: מָטָר מְזַבֵּל – Rain fertilizes.

Now when I was a boy and I learned Mesichta Kesubos, I didn’t understand that. A lot of things even today I don’t understand but I remember at that time being puzzled. If you want to fertilize your garden, will you pour water on it? You have to take manure or potash; the soil needs chemicals to help the water grow the food. Water on its own is not enough. I couldn’t see how *matar mizabeil,* how water fertilizes.

Chemistry and Relationships

Many years later I discovered how true it is. Listen to this. It’s another thing to think about when you’re praying for rain or when you’re stuck in a downpour.

Above every acre of ground, there is a tremendous amount of air. And air, as you know, is about 70% nitrogen and a bit less than 25% oxygen and then some other smaller ingredients. That’s what air is.

Now this nitrogen and oxygen in the air is the ideal fertilizer. If we could get the nitrogen and oxygen in the air down in the ground, we would solve all problems of fertilizer. The problem is that the oxygen by itself is not a fertilizer and the nitrogen is also not a fertilizer. In order to be a fertilizer, it has to combine. But they won’t. If you know basic chemistry then you know that nitrogen is an inert gas; it hates to combine. Oxygen is a very congenial element, very friendly, and it’s willing to combine with anything. But nitrogen is not interested – it’s a loner.

The Lightning Shidduch

And because no *shidduch* is made that's why you don't have any fertilizer. Instead you have to bring in your own fertilizer; you have to buy bags of ill-smelling stuff and pour it out in your garden. Or in the olden days, you had a goat. You tied the goat to a fence in the garden and he got busy fertilizing your vegetable patch. And all the time, you're looking up at this column of unused fertilizer and you're thinking, "If only they would combine! Isn't it a pity?"

Hakodosh Boruch Hu, however, has pity on us and He sends lightning. When the lightning streaks through the air, it creates a path that is so hot that even the lazy nitrogen can't resist. The nitrogen refuses to enter this *shidduch* with the oxygen but lightning is such an effective *shadchan* that it forces the nitrogen and the oxygen to unite and it becomes nitrates. Nitrates! That's fertilizer! Now you know why Hashem created lightning. Every time there is lightning, He's creating great amounts of fertilizer for you.

The problem is that it's in the form of a gas. Bags of fertilizers don't fall down after lightning. It's a gas. It's waiting in the air doing nothing. How does it come down?

The answer is *morid hageshem!* As the rain comes down it dissolves the gas and brings these nitrates down to the earth. Every raindrop becomes fertilizer too. And now we understand what our Sages said. מָטָר מְזַבֵּל – rain is actually a fertilizer. Not water. If you take water out of your well, it won't fertilize your field, but rain as it comes down and it dissolves the nitrates and it brings it down, it fertilizes the field. And because of this wonder plan, that's why the earth is constantly being fattened and replenished.

A Deluge of Kindliness

And that's why it's מַשִּׁיב הָרוּחַ וּמוֹרִיד הַגֶּשֶׁם and right away we say מְכַלְכֵּל חַיִּים בְּחֶסֶד – *He supplies life with everything in kindliness.* Because that's what we think about whenever we think of the rain cycle; that Hashem is feeding us with *nissei nissim.*

And so when we say מַשִּׁיב הָרוּחַ וּמוֹרִיד הַגֶּשֶׁם wouldn't it be worthwhile, at least once in our lives, to stop a little bit in our gallop towards עוֹשֶׂה שָׁלוֹם בִּמְרוֹמָיו and contemplate what we're saying: "מַשִּׁיב הָרוּחַ*! Ay yah yay!* וּמוֹרִיד הַגֶּשֶׁם*! Ay yah yay!*" *B'shaas hadchak* you can even say it twice if you want. Rebbehs have done that; they've said it twice or three times. It's a good idea to stop and think what you're saying; for once in your life, wake up and acquire some *deiah*, thank Hakodosh Boruch Hu for this great blessing of the wind and the rain.

Enjoying Rain

Now, included in the attitudes that we have to acquire when it comes to appreciating the mystery of rain is one very important attitude and that is that *we too are rain* – people are made up of raindrops.

It could be that when you hear these words for the first time it seems foolish and therefore in order to understand the greatness of rain, we must go back to the study of chemistry. Chemistry, you have to know, is a factual subject. It deals with mathematics, with things you can measure.

Now, chemistry tells us that the human body is composed of almost three-quarters water. Look at your neighbor; if you look at yourself you won't believe it, but take a look at your neighbor. He's a bag of water; he's around 70% water. And no matter what you'll say, you can't get away from that fact; it's a mathematical truism. I am water and you are water. And that water came from someplace. It came down from the clouds on a rainy day.

What a miracle a tree is! What we call an apple tree or a pear tree, it's more correct to call it a water tree. We don't because we look at the final product but really they're water trees. I explained this recently. They once planted a tree, an apple tree, in a big tub full of earth and left it outside. They weighed the tree and they weighed the earth. And every year, the tree produced apples, year after year. And they weighed the apples every year and added it up. Bushels and bushels of apples. After ten years they had gathered more than a thousand pounds of apples.

At the end of these ten years, they again weighed the tree and the earth and they discovered that the earth had diminished only a couple of ounces. The earth was only a couple of ounces in weight lighter than it had been years ago.

So the question is: Where did the apples come from? For ten years, many pounds of apples had come off this tree and the tree had drawn its nourishment from the earth. But the earth is still there! And the answer is that the apples actually take out very little of the earth. It's important, this little bit it takes, but by weight it's only a tiny fraction of the fruit. The fruit is almost entirely water. It's the rain that becomes apples.

How does rain become apples? By means of miracles. Rain is hydrogen and oxygen. And in the air, there is carbon dioxide. The tree, every plant, has the ability to take these simple materials, carbon dioxide and water, and break them down and then reassemble them. And it's a marvel how many different combinations can be made from these elements. You know there are many hundreds of carbohydrates and each one looks different and tastes different and has different properties.

And all of these materials, the tree is able to make from nothing but water and air. Sunlight helps out and a tiny trace of materials from the soil but if you'll analyze by weight, most of the fruits are nothing but water. And therefore when it rains, not only the next generation is coming down, but all the fruits and wheat and rice, all food, is coming down.

So imagine we're looking through the window now. The rain has no color but in our minds' eye it's especially colorful. We know red cherries are coming down right now, red cherries. Apples

too. Delish apples and Cortland apples and McIntosh Apples, Winesap. Every kind of luscious fruit. Pears, green pears, seckel pears, pears with a red blush on their cheeks. Golden oranges and apricots. Blueberries and bananas. They're all coming down. Watermelons are coming down. What are watermelons? At least there you hear the words water so it gives it away. But really everything is water. Fruit are actually physically coming down. It's not a mashal. And of course cabbages and lettuce; they're all water. And potatoes. Every imaginable fruit is coming down right now.

Besides the fact that water is also coming down. Water to drink, water that becomes soda, water that gets into grapes and becomes wine, and this water turns into the tears that wash our eyes. It turns into our blood. It turns into the liquids that lubricate our joints. It turns into every part of our body. This water that comes down now will turn into us.

> So that's part of living successfully! As we pray for rain in the rainy season and the warmth of the sun in the ripening season we keep in mind the signs of wisdom in phenomena of nature that leads to דעת ה׳. See the "Gate of Reflection", in "Duties of the Mind".

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1. Water, Ultimate Giver of Life, Points to Intelligent Design ↩