



## Radiation and *The Fantasy Trip*

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### ❧ Discovering Radiation

Radiation is a relatively new discovery among chemists and scholars on Cidri, though its effects have long been known, if not wholly understood. For generations dwarven miners have been beset by a illness they call “hot-earth ague”. This is not a true disease, but a reaction to radioactive ores and gasses in the deep mines, manifesting as radiation poisoning. Recent investigations into this sickness by physickers have led to new theories and discoveries about the invisible radiant power we know as radiation.

### ❧ Types of Radiation

There are four types of radiation that we will cover - Spectrum, Ionic, Energetic, and Magical.

#### Spectrum Radiation

Spectrum radiation here refers to the visible spectrum of light, plus infrared and ultraviolet light. Visible light is made of all the colors we see, and is not harmful to most creatures, though some nocturnal beings and undead are repelled or injured by it. Infrared (IR) radiation is associated with radiant heat, with sources such as fires, the Sun, and many living things. Infrared is perceptible to some creatures, and like visible light it is not harmful to most creatures except in massive doses. Ultraviolet (UV) radiation is a wavelength of light just beyond visible light. Also known as “black light”, it causes fluorescence in various substances. Some animals, notably insects, see into the ultraviolet range. UV light can be harmful to living tissue in prolonged doses, with sunburn and sun poisoning being the usual results. Many creatures produce melanin in their skin, fur, or plumage, which helps block UV light from doing damage.

## Ionic Radiation

Ionic radiations are highly charged subatomic particles. Alpha radiation (made of helium nuclei) and Beta radiation (made of stray electrons) are the most common forms of ionic radiation. These radiations have weak penetrating power but are capable of doing massive damage to organic tissues.

## Energetic Radiation

Energetic radiation is any of the the high-frequency wavelengths of energy such as X-rays, Gamma radiation, and Cosmic Rays. Neutron radiation, which is made of particles, is also in this category. Energetic radiation is strongly penetrating. Low-frequency radiation also exists, in the form of radio waves and microwaves, but it is not destructive in the same way as energetic radiation.

## Patagurgic (Magical) Radiation

Magical radiation is a type of energy found on Cidri, but not (yet) seen on Earth. It is a chaotic form of energy produced by magical forces. Also known as patagurgic radiation (from *pata*-, “hyper-symbolic”, and *gurge*, “vortex or whirlpool”), it has a variety of unusual and unpredictable effects. Patagurgic radiation does not produce radiation sickness, but has its own unique effects.

## ☞ Gaming Radiation

In order to incorporate radiation into your adventures, you need to know how strong is it, what effects it has, and how it can be blocked or cured.

## Rads

The strength of a radiation source is described in *rads*. This is a relativistic number which represents how much of the radiation is needed to have an effect. One rad of Spectrum radiation is not the same as one rad of Ionic radiation, but they are both checked in the same way. High levels of radiation take effect more quickly.

It's important to note that radiation, like light, attenuates as it gets further from its source. This means that the particles and waves become spread out and the radiation is reduced over distance. In game terms, the power of a radiation source decreases based on how many megahexes are between the source and a target. To determine the attenuation effect, divide the strength of the radiation by the number of megahexes away the target is from it. So a character in the same megahex, or any megahex adjacent, to a radiation source gets the full rad dosage. A character two megahexes away gets a half dosage ( $\text{rads} / 2$ ), three megahexes a third ( $\text{rads} / 3$ ) and so forth.

Living beings accumulate rads based on their exposure, minus any protection. Each turn take the number of rads they are exposed to and subtract any anti-radiation protection they have. This is the number of rads that reach them, and it is added to that being's current rad level.

### Rad Level

This is the amount of radiation currently in a living being's system. Rad checks occur each time the being reaches a certain level of rads. Rads can be removed by various means, and will also dissipate out of the system normally as long as the source isn't inside the body. When the radiation source is internalized, it must be removed before recovery can occur.

## Rad Checks

Each time the target reaches a certain amount of rads, they perform a *rad check* to determine the effects of exposure. This happens every time the being's rad level increases by 50 points. So the first rad check is at a rad level of 50, the next at 100, then 150, and so on. If the being suffers a massive dose of radiation in one turn that pushes it up multiple increments of 50 (say a burst of 200 rads), they would make a separate rad check for each block of 50 rads they increased by.

To perform a rad check, the target must make a 3 dice roll against their *rad resistance*. This attribute is determined by the type of lifeform they are, rather than derived from other attributes.

### Rad Resistance

Rad resistance is standard for beings of the same type. Most animals and intelligent races have a rad resistance of 8. Deep-dwelling races regularly exposed to environmental radiation, like dwarves and goblins, have a rad resistance of 10. Stone-based lifeforms, like gargoyles and stone beetles, have a rad resistance of 12. Arthropods, like spiders, crabmen, and scolopendra, have a rad resistance of 14. Dragons, who produce a degree of radiation internally, have a rad resistance of 16. Demons and slimes have a rad resistance of 18. Elementals and unliving beings are immune to radiation. Conversely, shadowights are more vulnerable to radiation and have a rad resistance of 6.

Failing this roll causes the target to develop *radiation sickness*. There are three levels of radiation sickness - mild, serious, and critical - and every time the target fails a rad check they develop the next stage of radiation sickness. Thus someone with no radiation sickness first develops the mild form, and then if they are further exposed to radiation without treatment and fail their roll again, it progresses to serious. Critical failure on the roll jumps up two levels (none to serious, mild to critical). Further failed rolls after reaching critical radiation sickness accrue extra effect rolls at that level.

### Radiation Sickness

Here are the effects a sufferer of radiation sickness might endure at each level of exposure. When reaching one of the levels of sickness, roll 1d to determine the effect. Failing a rad check while at critical sickness means rolling another effect from that table.

Mild:

- 1-2: General weakness (-1 ST)
- 3-4: Internal dehydration (-1 DX)
- 5: Persistent headache (-1 IQ)
- 6: Marked lassitude (-2 MA)

Serious:

- 1-2: Significant enervation (-2 ST)
- 3: Uncontrolled trembling (-2 DX)
- 4: Profound disorientation (-2 IQ)
- 5-6: Extreme nausea (-4 MA)

Critical:

- 1: Hair or tooth loss
- 2: Skin loss or scarring
- 3: Sterility
- 4: Spontaneous hemorrhaging, cellular damage to organs (-1 ST permanent loss)
- 5: Severe palsy or rictus, cellular damage to muscles (-1 DX permanent loss)
- 6: Confusion or temporary amnesia, cellular damage to neurons (-1 IQ permanent loss)

Non-permanent effects of radiation sickness last until the being's rad level drops back to zero. If the effect is caused by radioactive material within the body, then that must be removed or flushed out with antiradiation potions before any recovery can occur. Nothing can reverse permanent damage or attribute loss caused by critical radiation sickness except the *Regeneration* spell or a wish.

## Patagurgic Manifestations

When failing an exposure roll to magical radiation, the effect is quite different than other forms of radiation. Instead the chaotic magical energies can cause changes small and great upon the being. These effects appear to only occur in living creatures - undead, golems, and other beings without organic life processes are unaffected.

Mild:

- 1: Color change in part of the body (hair, eyes, skin, etc)
- 2: Voice changes (roleplay this)
- 3: Minor sensory change (vision goes negative, hearing register shifts, etc)
- 4: Becomes luminous, giving off as much light as a lantern
- 5: Produces an unusual sound or scent
- 6: Becomes translucent like a jellyfish, not invisible but unsettling

Serious:

- 1: Develops characteristic of another animal or plant (tail, wings, beak, leaves, etc)
- 2: Personality inverts (becomes opposite of usual self)
- 3: Time-shifted, moves (and ages) half or twice as fast as normal
- 4: Develops a new sense (can smell colors, hear densities, see x-rays, etc)
- 5: Becomes magnetic (messes up compasses, small iron objects stick to them)
- 6: Randomly teleports (GM controls effect)

Critical:

- 1: Turned into a "living substance" (iron, glass, lava, vapor, etc - GM's choice)
- 2: Two main attributes (ST, DX, IQ) swap their values
- 3: Ungoverned telepathy (GM controls effect)
- 4: Involuntary insubstantiality (may be intermittent)
- 5: Profound hybridization, taking on numerous traits of a different life form
- 6: Changes race (human to orc, etc), sex, or devolves

The GM is free to add their own effects, the magnitude of which should be appropriate to the level of the manifestation. The Wizards' Guild records cases with other manifestations than those listed here.

Patagurgic manifestation abate at the same rate as radiation sickness. Critical effects are permanent unless treated (these sufferers are known in magical circles as *chimerae*). The treatments for patagurgic exposure are different than for other radiations, and are discussed in the *Treatment and Protection* section.

## ☞ Sources of Radiation

Here are some general radioactive sources you can incorporate into your campaign. They should also give you a baseline for adding your own sources.

### Spectrum

Full direct daylight produces 5 rads of UV per hour, so beings exposed for a long time may develop radiation sickness. Fortunately there are a large number of cures for these complaints, and UV is easily blocked by clothing and shade. Sunlight amplified by reflection, such as in the desert or on water, has double strength.

### Ionic

Internal exposure to one gram of thorium or a low density radioactive gas like radon is 1 rad. A gram of radium or dense radon source emits 2 rads, and a gram of uranium ore (pitchblende) emits 5 rads. Ionic radiation is weakly penetrating, often stopped by epidermis, but does horrendous damage once it enters the body.

## Energetic

Sources include radioactive isotopes like radium-226 (1 rad per gram), uranium-238 (10 rads per gram), and heavy plutonium (100 rads per gram). Mnoren artifacts may contain energetic materials.

## Patagurgic

One rad of patagurgic radiation is the amount given off by one gram of *demiurgosc*, a substance found as trace residue (about 1 milligram) in summoning and creation spells. Other sources of patagurgic radiation are materials and items from other planes (such as the demonic realm), by-products of magical experimentation, and unusual meteorites.

## ☞ Treatment and Protection

Here we'll cover the ways of treating radiation exposure, and some tactics for avoiding or minimizing it in the first place.

### Natural Recuperation

A living body removes radiation at a rate equal to that being's rad resistance per day. So for example a human being has their rad level drop by 8 points each day. Any non-permanent effect from radiation will abate once the rad level is down to zero. Note that if the radiation source is internalized, the emitter needs to be removed or flushed out before healing can truly begin. The being's rad level will not drop naturally if the source is still in their body.

### Antiradiation Potion

*Antiradiation potion*, also called *antirad*, is adapted from dwarven folk remedies for "hot-earth ague." Antirad potions remove 50 rads per dose. The potion also breaks down internalized radioactive materials, allowing the body to pass them out.

To produce one antiradiation potion requires 4 ounces of iodine tincture (\$20), a dram of trefoil plant extract (\$16), a pinch of cochineal (\$9), and \$30 in common ingredients. It takes 1 week to make. The finished potion retails for \$120.

### Countermagic

To treat the patagurgic manifestations that result from magical radiation exposure, you'll need to employ countermagic. Depending on the effect of the exposure, certain magical spells may be able to reverse them. In most cases *Dissolve Enchantment*, *Regeneration*, or *Shapeshifting* may be required. Note that if *Shapeshifting* is used to undo the effects of patagurgic radiation by returning the sufferer to their normal state, this acts as a cancellation rather than a regular casting of *Shapeshifting*, and thus would not be undone by a later casting of *Dissolve Enchantment* on the subject. And as always, a wish can achieve the desired cure as well. Undoing the effects of patagurgic manifestations removes the radiation itself as well, bringing the being back to a rad level of zero as each effect is undone.

### Plumbaize (Lead Alloy Armor)

As the old saw goes, the best cure is not getting sick in the first place. Dwarven miners have long known that various metals protect against the effects of radiation sickness, with none better than lead. They also know lead is soft, heavy, and toxic. So an enterprising clan of dwarves devised an alloy of lead and other metals, which they dubbed *plumbaize*. This alloy is lighter and stronger than pure lead, but with the same radiation-stopping power. It makes a passable armor, though not as effective as steel, but is indispensable when working around radioactive sources. A quarter-inch thickness of plumbaize stops the quantities of radiation listed in the *Treatment and Protection Matrix*.

A suit of plumbaize plate weighs 60 pounds and stops 4 hits of damage. It has a -5 DX penalty and limits MA to 6. The armor retails for \$2200, in part because it is a specialist item. It does not protect from internalized radiation sources, of course. Thicker layers of plumbaize stop additional rads as per the protection matrix (twice as thick equals twice as much protection, etc). Plumbaize alloy, when available, can be bought for \$25 a pound. A pound of plumbaize is 3 cubic inches in volume and makes a quarter-inch-thick plate 3 inches by 4 inches.

## Treatment and Protection Matrix

This table is a quick reference to the treatments and protections that are efficacious for each kind of radiation. An (X) indicates a useful treatment or complete protection, and a (-) indicates it has no radiation-abating effect. A number indicates how many rads of the radiation are blocked or removed.

	Spectrum	Ionic	Energetic	Patagurgic
Antiradiation Potion	50	50	50	-
Healing Potion	30	-	-	-
Scour	-	100	-	-
Regeneration	X	X	X	X
Clothing	10	5	-	-
2pt Armor or better	50	10	-	-
Plumbaize	X	X	200	-
Spell Shield	-	-	100	100
Stone Flesh	X	X	10	10
Iron Flesh	X	X	30	20
Diamond Flesh	X	X	50	30
Invisibility	X	-	X	-
Insubstantiality	X	X	X	-
Pentagram	-	-	-	X
Dissolve Enchantment	-	-	-	X
Shapeshifting	-	-	-	X

## ☞ Detecting Radiation

Radiometry is a new science on Cidri, so radiation detection and measuring methods are still rudimentary.

Dwarven miners for generations have relied on an aquatic worm that lives in limestone water pools. Known as **warnworms**, their metabolism changes in proximity to radiation, changing the worm's color from pallid white through various oranges to finally a vibrant red. Warnworms are small and usually kept in a stoppered flask of limestone water around the neck. Occasional feeding and some zinc oxide dust keep the worm healthy and happy. Warnworms can detect all forms of radiation except patagurgic.

Wizards rely on **duskenglory** vine leaves to detect patagurgic radiation. Dried pressed leaves react to patagurgic radiation by changing from pale green to vivid purple. The leaves also react to above-normal levels of energetic radiation by developing a silvery sheen.

The Mechanics Guild has been working on a **radiscretor**, a device that detects and categorizes types of radiation. It is a cumbersome and inexact device, but given time the guild will develop a suitable detector for all kinds of radiation.

## ☞ Using Radiation In The Game

There are some basic ways that radiation is likely to come up in an adventure — as a hazard, as a weapon, or as a plot element.

Radiation hazards may be natural, magical, or artificial. A cave may be filled with radon gas, a magical rift may be changing nearby creatures with patagurgic radiation, or a mechanical device or artifact may be releasing radiation. In these cases the radiation source will be a passive threat, one which the players must avoid, counteract, or eliminate in order to reach their goal.

Radioactive weapons are uncommon but do exist. Most often these are crude weapons, such as arrowheads made from minerals containing pitchblende (accidentally or deliberately). Those knowledgeable about radiation use it more effectively. The necromancer Rontgennal has commissioned swords made from strontium-90 alloy for his skeleton warriors. The undead army is unaffected by the radiation from the foul weapons, but the blades are terrible when used against the living. The swords are sheathed in scabbards of lead when the army is at rest. And of course there may be weapon artifacts that produce radioactive effects.

Finally, radiation may be a major or minor plot element in an adventure. It could be at the heart of a cunning trap or mysterious puzzle, or it could be the key to revealing a hidden secret, or it may be powering an otherworldly machine. It's all in how the GM wishes to use it.

## ☞ Some Radioactive Items

**Dirty-Rad Arrow** - An arrow fitted with a stone arrowhead of raw isotope ore. Depending on the isotope, each arrowhead is an ionic (alpha) or energetic (gamma) radiation source of 5-20 rad intensity.

**Strontium Blade** - Like those commissioned by the necromancer Rontgennal, these are forged with strontium-90 in the alloy mixture. They are 30 rad ionic (beta) sources and need to be carried in a lead or plumbaize scabbard to shield a living wielder. The wielder will still be exposed to the radiation when using the blade, but armor protects against that, whereas a wound from the blade inflicts the full rad exposure immediately upon the target.

**Helioshale** - A mineral found on Cidri that is a UV emitter. One carat of this brilliant purple gemstone emits 25 rads of UV. Small chips of it or a thin layer of pulverized helioshale dust emits only 1 rad.

**Wormwood Heart** - These glossy coal-colored orbs are often, but not always, found inside a cadmium alloy case. They are radioactive fuel pellets, possibly used by Mnoren machinery long ago. While inside their case they are harmless, but outside of it they are powerful neutron emitters. Depending on the size and state of the pellet, it may emit anywhere from 1 to 100 or more rads of energetic (neutron) radiation.

**Chimeric Lantern** - Normally shielded by magic-infused shutters, when this lantern is opened the patagurgic radiation of its source streams out. Powered by a piece of starstone or a distillation of demiurgosc, the lantern allows the chaotic energies to be focused in the direction the wielder chooses. Typically the lantern is a 50 rad source. These items are banned in civilized areas and possession of a chimeric lantern may lead to a visit from the Wizards' Guild or witch-hunters.