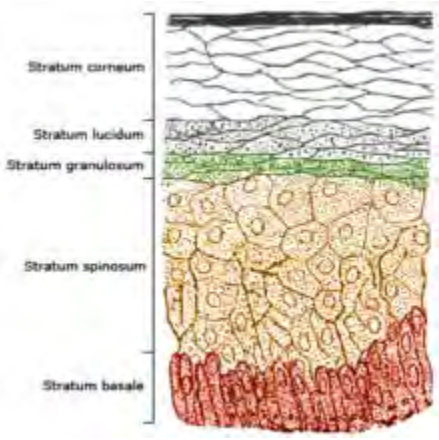
Vitamin-D Production

(1/17/2017)

Uv light is needed for Vitamin-D production to keep bones healthy. How to do this after the pole shift.

A diet deficient in vitamin D in conjunction with inadequate sun exposure causes osteomalacia (or rickets when it occurs in children), which is a softening of the bones. Rickets, a childhood disease, is characterized by impeded growth and soft, weak, deformed long bones that bend and bow under their weight as children start to walk. This condition is characterized by bow legs, which can be caused by calcium or phosphorus deficiency, as well as a lack of vitamin D.

Synthesis in the skin



In the epidermal strata of the skin, production is greatest in the stratum basale (colored red in the illustration) and stratum spinosum (colored light brown).

Vitamin D_3 is produced photochemically from 7-dehydrocholesterol in the skin of most vertebrate animals, including humans. The precursor of vitamin D_3, 7-dehydrocholesterol is produced in relatively large quantities. 7-Dehydrocholesterol reacts with UVB light at wavelengths between 270 and 300 nm, with peak synthesis occurring between 295 and 297 nm. These wavelengths are present in sunlight, as well as in the light emitted by the UV lamps in tanning beds (which produce ultraviolet primarily in the UVA spectrum, but typically produce 4% to 10% of the total UV emissions as UVB). Exposure to light through windows is insufficient because glass almost completely blocks UVB light.

Adequate amounts of vitamin D can be produced with moderate sun exposure to the face, arms and legs, averaging 5–30 minutes twice per week, or approximately 25% of the time for minimal sunburn. The darker the skin, and the weaker the sunlight, the more minutes of exposure are needed. Vitamin D overdose is impossible from UV exposure; the skin reaches equilibrium where the vitamin degrades as fast as it is created. This is caused by the lower frequencies that are normally in sun light.

How can one produce efficiently enough light after the Pole Shift that Vitamin-D in the body is maintained?

The electromagnetic spectrum of ultraviolet radiation (UVR), defined most broadly as 10–400 nanometers, can be subdivided into a number of ranges with UVC being the closest to what is needed for Vitamin-D production.

Name	**Abbreviation**	Wavelength (nm)	**Notes / alternative names**
Ultraviolet A	UVA	315–400	Long-wave, black light, not absorbed by the ozone layer
Ultraviolet B	UVB	280–315	Medium-wave, mostly absorbed by the ozone layer
Ultraviolet C	UVC	100–280	Short-wave, germicidal, absorbed by the ozone layer and atmosphere

Thus in theory a UVB bulb would be the best to use to get 295 to 297 nm. There are "UVB Narrowband " for 311 nm sold that are pricy and not test yet that might work if one is careful not to get an over dose for there is no lower frequency to manage that. There is the "Exo Terra UVB200" that would be less energy efficient but the best of the reptilian care type bulbs. This also should work better in that it has lower frequencies, yet it has not been tested.

One good recommended way of choosing a bulb is to get the spectrum curve for various bulbs and chose the bulb that produces the most light intensity around 295 to 297 nm for any given wattage. I found this hard to do in actual practice.

The only reasonably costing filter found that could test bulbs in this range was a pass band filter that peaked at 270 nm and measured from 250 nm up to about 320 nm blocking all of the rest above and below this range. Using this 270 nm filter and testing of various bulbs used for water purification and in aquarium sterilizers and one old design for reptilian health resulted in the following table.

Testing of Various bulbs for UVC content

Various UV lamps	Type	Wattage	Inches to = nXSun's Lux
Odyssea Aquarium Sterilizer	UVC	18	18"=1XSun
Odyssea Aquarium Sterilizer	UVC	18	12"=2XSun
26w 10.0 compact florescent	UVC	26	4" =1XSun
Stinger Insect Zapper BK300	UVB	28	0"=1/26XSun
PowersunUV Mercury Vapor	UVB	100	0"=1/6XSun

The low pressure mercury vapor heated filament bulbs that produce UVC were found to produce the most efficient light equivalent to the suns UVC range. These are typically used for germicidal and aquarium sterilizer uses, see the following for what they look like. The medium pressure mercury UVB bulbs tested did not indicate very much intensity

below 320 nm. Most all UVB bulbs are sold for care of reptilians. Thus they also produce a lot of UVA and full spectrum sun light. This apparently is a good thing and needed to balance vitamin-D production. No tanning bulbs were tested. They are similar.

Specifications:

- 110V-120V / 60Hz, 18W
- Length Overall: 8-1/4"
- Average Life Hour: 8,000hrs
- 2G11 base 4-pin

For measuring the light output from a UVC bulb see the file on:
"Recomended_Light_Meters_Capable_of_Low_Lux_and_UVC-2017.pdf"
8000 hours is close to a year's time running full time. This is what they are designed for. After the pole shift when power is scarce they will be turned on and off and will not last as long as 8000 hours. Yet they could last up to 10 years in this mode.

The output of the UV lamp decreases slowly with age and has a useful life of 8000 hours. Beyond 8000 hours the lamp output starts degrade rapidly and disinfection performance will be suspect. The unit needs to be turned on for a minute our two to come up to full UV light output if that is needed. It is not for most purposes.

To produce vitamin-D in the body one would like to use the most energy efficient bulb one has at hand that will produce Vitamin-D without harming the body. It is quite tempting to want to use these UVC bulbs for this purpose. My testing of the 18w UVC bulb indicates it is dangerous and will only burn the skin. For it is doing its germicidal job of killing live cells. It only takes a few minutes of exposure at arms length to feel the effects. It shows up 15min to an hour after the exposure. It starts with obsessive itching of the face and then as time goes on it turns to pain where one can fell the individual cells dying it is like bad sunburn without the tanning effect, that doesn't go away anytime soon. Nothing seems to stop it. This is not the right bulb for this purpose. Even a very short exposure does the same thing of killing cells and the symptoms are less but similar.

Remember to always use UV safety glasses when working with any UV light bulbs. This includes UVA, UVB and UVC. Otherwise one eyes will be burned similar to the skin.

My current understanding is that the tanning and reptilian UVB bulbs would be the best to use. That one could use the above 270 nm tester to determining the rough order amount of UVC output for the lamp. Whatever you choose, do not over do it and do testing on a gradient over many days. If using sun glasses, make sure they will protect against UV. Use the made up UVC light meter and a strong UVC source to test your UV glasses.

Use your own discernment as to what to use. Do not use UVB or UVC to get a sunburn see tanning reference at the end, and the higher probability of getting skin cancer with these frequencies. Use UVB bulbs only in moderation to get sufficient vitamin-D and only with good UV eye protection to keep the eyes safe from being burned.

UVC Sterilizers for Water Purification

In aquarium use a UVC sterilizer is used to control infections by stopping the spread of microorganisms from one fish/coral/invertebrate to another through the water. It is also used in pond applications to control free-floating algae. When operated correctly, free-floating microorganisms will be killed by the UVC light.

UV light targets the smallest of microorganisms, without harm to your other aquarium inhabitants. It works by altering the invader's genetic material. This ultimately shortens the organism's life cycle, thereby limiting its reproduction. Thus, that one single, tiny cell has less chance to blossom into an algae bloom or rapid-spreading disease.

How Does UVC Disinfect Water?

When disease causing microorganisms are exposed to UV light of proper intensity in water their DNA is disrupted, disabling the microorganism’s ability to replicate and to cause illness. The following pictures show several types of portable uv water disinfecting units.

The CamelBak shown above on the right will treat 80 cycles or 16 gallons with each charge of the rechargeable battery. It will convert nearly any clear natural water source into potable drinking water in just 60 seconds of shaking while the UV light is on. Sells for about $80-$100. It can be recharge from a USB or 5v dc source. There are low cost adaptors that can be used with 12v dc sources to convert to USB 5 volts.

Note that the 18 watt bulbs tested above, has its power at one end only. Thus one could put the other end in water in a 5 gallon bucket that needs to be purified for about 30 seconds to a minute. A stirring action could be used during this time to equally expose all of the water. The height of the water would be such as to not splash into the socket at the top. In this way filtered water could be decontaminated of pathogens in a primitive environment where some power is available. Note: Taping the bulb to the socket with black electrical tape would be a good idea to keep the bulb in place and to avoid water splashing or getting into the bulbs electrical connection. If this is going to be done be sure to use gloves, UV safety goggles an other items to cover the skin and face from this light.

Using one of these UVC bulbs during an emergency repair operation on a person in a primitive environment to help disinfect the environment and air in the room has not been tested yet could be useful if done intelligently. Maybe as a minimum it could be turned on to disinfect the room before use, and turned off during the use of the room. Maybe air and the water used in the room could be disinfected by this light before use. This light does produce ozone in the air. Too much of is another danger. Yet ozone is a good oxidizer and does some purifying on its own. So a happy medium of use and avoiding use could be reached. The human nose is 10 times more sensitive to the detection of ozone than the concentration of ozone that is dangerous.

References:
https://en.wikipedia.org/wiki/Vitamin_D
https://en.wikipedia.org/wiki/Ultraviolet
https://en.wikipedia.org/wiki/Ultraviolet_germicidal_irradiation
https://en.wikipedia.org/wiki/Indoor_tanning