

(Edited for content for RUVI, with permission of the Authors.)

Hello friends,

Several people have sent me links to different threads round a bout concerning the new Finland study untitled "UV Lamps for Terrariums". Melissa Kaplan on the IML Yahoo! Group was the first I know of to post a very select portion of that study. Soon others were engulfed in this very interesting topic. I do believe we are the only place to have the complete written text of the foresaid paper on the 'net. I have permission to share my conversations about this study from one of the authors with my "colleagues". I would consider that to be those on this group [UVB Meter Owners Group], people with enough interest to understand the needs of their "exotic" pets. I would ask that this personal information is kept on this list, but please invite any of those on the net that have an interest in this topic to come here to view it in its entirety. All of this will in time be part to the UV Information Site that some of the friends are building for us. It will of course make it easier to direct people to a web site for the amassed knowledge we have put together here. (Big thank you again to Diane for having the insight to build this [UVB Meter Owners] group).

This study is particularly interesting to me because it expresses the need for not only the amount of UVB, but to have it in the right nanometer range (D-UV). This is something I have expressed over the years and is documented in some of the papers I have in the files section. I do feel embarrassed that I missed the paper that Jukka refers to by Webb, DeCosta, and Holick that concerns the photo-destruction of Vitamin D3 by higher ultraviolet radiation that prompted his research.

Now, not only are we interested in the D-UV range, but the destructive UV range as well. Please read the thread here thoroughly because Jukka and I have cleared up many of the concerns that have been brought up on the 'net concerning this information. We will post this thread in the files section as well.

This is far from the end. I can tell you that there is more to come in up-coming work. I do understand that not all that belong to the group want the deeper information written here. On the other hand, many have joined this group for just his kind of insight.

Enjoy, I know I really, really have!

BM

Discussions between Bob Mac and Jukka Lindgren follow
(Most recent appears first):

Jukka to Bob Mac:

Dear Robert,

Please find attached the English text-only portion of the article. You may be pleased to find, that Dr. Gehrman was one of the reviewers.

This text will enable you to get information about the background data, referenced articles and introduction of the D3 Yield Index as well as the reference to the article on higher wavelengths of UVB actually destroying vitamin D3 in skin. (This appears to have caused most discussion on the forums, unfortunately only the abstract is publicly available on the net.)

I'll have the magazine in the mail on Monday; it will take approximately a week to reach you.

Regards,
Jukka

Bob Mac to Jukka:

Dear Jukka,

Thank you for the paper. There is much I have questions about regarding it. Have you read the Gehrman team's recent paper "Comparison of Two Artificial Light Sources"? I will attach a copy for you if you don't have it. [See Scientific Studies Tab]

The comparison is between Sylvania™ BL lamps and the Westron Lighting (Active UV™) mercury vapor lamps. The mercury vapor lamps produced much higher 25-hydroxyvitamin D levels even though they have higher yields of the 320+nm D3-destroying spectrum.

It would seem that the higher wavelengths destroying VD3 would be part of the natural self-limiting process involved in this photo biological active reaction. As you are aware, the sun produces 30+ times the

amount of higher UVB-A between 9AM and 4PM (depending on location) than most reptile lamps, yet the design in all living creatures (requiring UVR) maintains just the right levels of D3.

Looking forward to your reply,
Bob MacCargar
www.reptileuv.com

Jukka to Bob:

Dear Bob,

Thank you very much for the Gehrman team's paper - most interesting!

I agree with you in that the photo-destruction of Vitamin-D3 is probably part of the self regulatory mechanism of Vitamin-D3 formation. Considering all papers and data I have seen, it makes perfectly sense.

The reason I brought up the issue of the photo-destruction in my article was that Webb/DeCosta/Holick's paper that describe it, appears to have gone largely unnoticed in most of the literature. I figured this is something that warrants some attention too.

The circumstances, where level of Vitamin-D3 already present in skin might start to fall, are fairly theoretical and would require quite specific poor conditions: UV-Irradiation at 315-330 nm and higher wavelengths only, steeply rising spectrum curve at that range, perhaps combined with too low basking temperature that would slow down the thermal conversion of Pre-D3 to vitamin D3.

A perfect candidate would be Sylvania Reptistar™. Please find attached its spectrum curve "Reptistar_UV.gif". (In this image, thick black lines show the bulb's spectral irradiation, the green 'triangle' curve is the action spectrum of photosynthesis of Vit.D3, and the red dotted line shows sum of these two. Here the curves are not in scale.)

While some faint irradiation is detected starting at around 280 nm, any significant levels are reached only at 305-310 nm and above, peaking at 330 nm. From this point of view, I would love to have a test set up, where this lamp was tested for promoting Vitamin-D3 and retaining (or perhaps degrading) serum levels of 25-hydroxycholecalciferol on animals obtaining Vit.D3 nutritionally...

As to the Active-UVHeat™ (Westron?) MV lamp, it got a reasonable D3 Yield Index, 165. This is only because of the extremely narrow, but very strong band of irradiation at 302-304 nm. Apparently this is enough to produce results as in Gehrman's paper. These results together would suggest that with this lamp, the conversion rate of 7-DHC to Pre-D3 (chemically boosted in skin) is far higher than simultaneous photo-destruction of existing vitamin-D3 to tachysterol and on to lumisterol.

Best regards,
Jukka

Bob Mac to Jukka:

Hello Jukka,

I have always been very concerned about the D-UV (JB Bernard) range and have many times stated that total UVB was not as important as the amount of UVB in the lower range (290-300nm). Admittedly, I was not as well versed about the destructive ability of the higher UVB-A range. Your paper is certainly an eye opener, and an important one.

In your paper you used a "FLOOD" MV-style lamp that only produced minimal UVB. The lamps in Gehrman's study were the SPOT Active UV Heat™ style lamps that produce much higher UVB than the floods. In his work you will see 300uW+ was responsible for the high 25 OH D levels (natural wild normal).

I have been involved in rehabilitation for 40 years and have observed remission of MBD when under mercury vapor SPOT lamps at twice the rate of ZooMed 5.0™ or the Sylvania BL™ lamps. My feeling is that if you had tested the SPOT-style version (normal output of 150uW/cm2 @12") of the Active UV™ lamp (also sold by T-Rex™), you would have had much different readings.

It should also be considered what the effects on real-life reptiles might well show different results than what you have found here in this recent study.

Below is a small piece of an article I wrote that was published in "Iguana" The Journal of The International Iguana Society a couple of years ago. The Bagnalls of ZooMed quoted part of this article in their recent two-page ad in Reptiles magazine. So you see, even though ZooMed is now a competitor, they have my greatest respect.

Over the past three years, I have studied failure and decay rates of mercury vapor lamps and conducted a general study of the major brand fluorescent tube reptile bulbs. I am constantly asked if I have tested a certain fluorescent brand bulb by individuals who have seen them listed inexpensively – in spite of the fact that, for many years, I have been telling people that quality UV is not cheap (unless we're talking about the great and wondrous sun). In a recent conversation with Voltarc Technologies, one of the largest manufacturers of reptile fluorescent bulbs in the nation, the engineers confirmed the fact that money buys UV.

Production costs rise with more exacting specifications (how much UV-B and where precisely it is to be delivered). In order to build a tube that will provide not only high UV-B readings, but one that will generate output in the useable 290-300 nm range, manufacturing tolerances have to be very precise. Two different fluorescent tubes can emit equal amounts of total UV-B, yet one will do a much better job keeping your pet healthy than the other (even though both bulbs might have been manufactured by the same company, but for two different distributors' specifications).

The best florescent tubes tested emit 15-30 $\mu\text{W}/\text{cm}^2$ at 12" after initial burning. A variety of good fluorescents (as well as many absolutely terrible ones) are on the market, but ZooMed 5.0™ is built to the most exacting tolerances according to all of the manufacturers with whom I have spoken."

Jukka, I very much appreciate you conversing with me on this subject. Please do not take any thing I say as an attack. When a study like yours is published, many will take your information and mislead the masses to their own end. Below is a portion of your paper.

"The second best lamp, a Zoo Med ReptiSun unit that had been used for 10 months, does not show remarkable weakening of UVB radiation. While examining the full spectrum, it can be seen that the irradiance of the lamp has dropped constantly throughout the whole spectrum. This means

that the UVB radiation of a lamp does not cease abruptly, as is sometimes suggested, but seems to get gradually weaker along with the visible light. On this basis a recommendation to replace the UV lamp twice a year due to alleged fading of UVB radiation is at least to some extent unwarranted. The conclusion is of course based only on one individual lamp; differences due to manufacturing tolerances etc. are entirely possible. A detailed research with a larger sample would be required to confirm this issue."

While you clearly state that this conclusion is only from one lamp, many have already taken this as fact. I have tested the output of thousands of reptile lamps over the last five years (our company, Reptile-UV and our Mega-Ray™ lamps are new this year). I tested the failure and decay rate of individual mercury vapor lamps during a three-year period of 300+ lamps. This was not as hard as it sounds because most self ballasted lamps only have 6 month life span, and some brands average as little as 2-3 months.

While I have endorsed the ZooMed fluorescent 5.0 lamps I can tell you that I have seen differences of UVB distribution reaching from as low as 3uW/cm² @ 30cm in 8 months old to 12uW/cm² at 30cm (and still burning) at over 36 months old. Most of them will produce reasonable UVB up to a year, but it can't be depended on nor should it be suggested that it will.

Almost all UVB reptile lamps will decay up to 80% in 12 months and most of that decay is over a 30-60 day period. While I have not figured out why precisely fluorescents have that problem (although it may be the same reason as the MV), I did manage to figure out why mercury vapor lamps have that problem, including the ZooMed Power Sun MV lamps, and I have corrected it in our new lamps.

The Mega-Ray is the only reptile mercury vapor lamp in the world that does not have this huge decay rate.

Have you asked Dr. Holick to join in these studies? His new Book, "The UV Advantage" is a real eye opener as he told me.

Also, your last note to me is very interesting reading. Many are thirsting for comments from the people involved in your study. Could I pass some of your comments on to others less our personal discussion on.....

Best regards,
Robert MacCargar

Jukka to Bob Mac:

(Jukka Lindgren)

I completely agree with you that my study is entirely theoretical. I tried to state this fact as clearly as possible on my article. Living reptiles may quite well show different results on the same products. There may well be multitude of chemical processes involved that never show up in 'in vitro' studies - let alone in spectral measurements! Dr. Gehrman, among others, have been conducting studies with live reptiles on this subject for years. I think I will leave it up to him/them to continue to do so and hopefully be able to verify or debunk the theoretical findings.

What you say about the decay in fluorescents up to 36 months old is very interesting. My comments about the 10-month-old ReptiSun™ must be taken with a pinch of salt considering the fact that I did not have a chance to measure the same unit new and old. They were two different bulbs and I tried to make that very clear in my article. The statement shouldn't be taken out of context there. I wish I could secure funding to run such a long-term test with some or all of the lamps now being offered. I will look into this more after the initial tests are completed. Much will depend on them...

I have not asked Dr. Holick to join this study. I will take this up with Dr. Gehrman.

I do not mind you passing my comments to your colleagues. Just please let them be aware I am just a hobbyist interested in lighting, not a PhD. I may not be able to comment on issues requiring academic background...

Best regards,
Jukka