

UV Lighting

Aim

To test various UVB producing Reptile Tubes to establish UVB output and optimum lighting set up. This document will be continuously revised as additional lights are tested and lights already tested age.

Method

The meter used is a *Solarmeter 6.2* Digital Ultraviolet Radiometer which responds to the range 280-320 nm with a peak response at 300nm. This unit is accurate to within 5%.

This meter is used regularly in the USA for bulb testing and comes highly recommended. The unit measures the amount of UVB striking the photodiode, which is on the top of the unit.



All lights tested were running in the enclosure pictured left. The enclosure is white plastic so some UV reflection is inevitable. Readings would be reduced in a darker enclosure.

Plants and other cage furniture was removed whilst testing.

Tube lights were all 2 foot, 18W and run off an arcadia starter. There is some evidence that the starters used can alter the efficiency of the bulb and therefore the UVB output. This is yet to be tested.

A tape measure was attached to the tubes bottom surface to ensure accurate and uniform distance measurements.

Each bulb was allowed to warm up for 10 minutes first as all of the bulbs tested took a few minutes to reach a constant output.

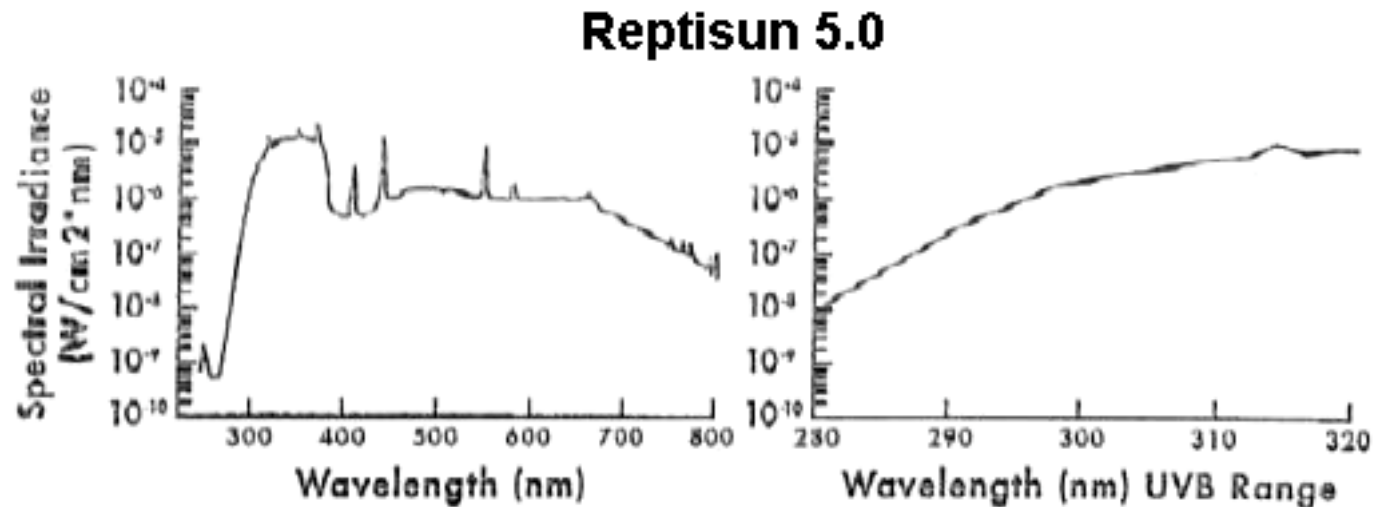
Note on UV lighting and reptile requirements.

UVB is a range from 280nm to 320nm. As reptile keepers we are most concerned with readings from 290 to 300 nm (296nm \pm 3nm). This is the range that triggers Vitamin D3 synthesis in the reptiles skin and is vital for calcium absorption and will be referred to as UVB-D throughout this document.

The only way to test the UVB-D range of a bulb is with a spectralradiometer but at \$50,000 that's a bit out of my price range.

The only practical method available to the reptile hobbyist is to measure the total UVB output. This still gives a good guide to comparative output, and can be used to judge how much UV travels from the bulb plus how reflectors and mesh effect the resulting UVB.

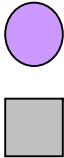
If two bulbs produce the same readings but the spectral power graphs (often shown on the packaging) show one produces more in the UVB-D range than the other I would choose the higher UVB-D producing bulb.



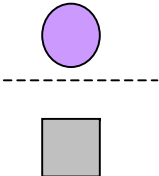
above: Reptisun 5.0 Spectral power graph

Measurements taken

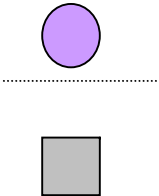
1. Light without reflector. No mesh in-between light and meter



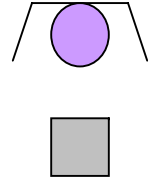
2. Light without reflector. 5mm galvanised silver mesh between light and meter.



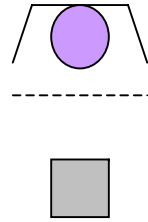
3. Light without reflector. Aluminium black fly screen between light and meter.



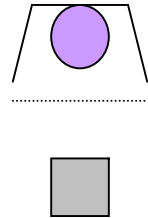
4. Light with reflector. No mesh in-between light and meter



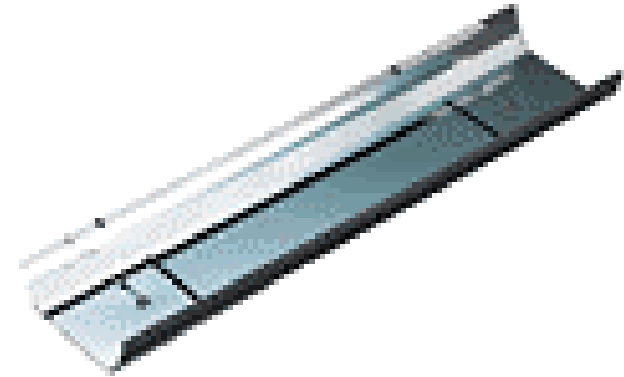
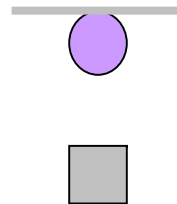
5. Light with reflector. 5mm galvanised silver mesh between light and meter.



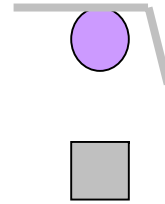
6. Light with reflector. Aluminium black fly screen between light and meter.



7. Light with flat tinfoil above the light. No mesh in-between light and meter



8. Light with curved tinfoil reflector above the light.
No mesh in-between light and meter



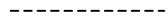
Key



UV Light



Meter



5mm Mesh



Fly Screen



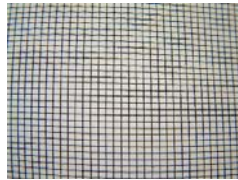
Reflector



Tin Foil



5mm Silver galvanised mesh



Black Aluminium Fly Screen

Zoomed Reptisun 5.0



All readings are in $\mu\text{W}/\text{cm}^2$

	1	2	3	4	5	6	7	8
Distance in inches	Tube	5mm mesh no reflector	Fly screen no reflector	Reflector	5mm mesh + reflector	fly screen + reflector	flat tin foil reflector	curved tinfoil reflector
2	128	104	83	233	173	142	123	193
4	67	57	48	136	96	83.5	68.5	106
6	47	38	29.5	87	62.5	55	47	71
8	33	28	23	64	46	40	35	52
10	26	22	19	48	36	30	28	42
12	22	18	15	37	29	24	23	32
14	18	15	13	30	24	20	18	26
16	15	13	11	25	19.5	16	16	22
18	13	11.5	9.5	21	17	14.5	15	19
20	11	10.5	8.5	18	15.5	12	13	17
22	9.5	9	7	16	14	11	11	14
24	8	8	6	14	11.5	10	10	12.5

Repti-glo 5.0



All readings are in $\mu\text{W}/\text{cm}^2$

	1	2	3	4	5	6	7	8
Distance in inches	Tube	5mm mesh no reflector	Fly screen no reflector	Reflector	5mm mesh + reflector	fly screen + reflector	flat tin foil reflector	curved tinfoil reflector
2	100	88	65	186	136	116	100	180
4	54	49	36	107.5	83	64	60	102
6	37	30	24	70	54	42	38	69
8	28	23	18	49	39	31	27	51
10	22	18	14	37	29	23	22	38
12	17	14	11	29	23	18	18	30
14	14	11	10	23	19	15	14	24
16	13	9	8	19	16	12	12	20
18	11	8	6	16	13	10	11	17
20	9	7	5	14	11	9	9	14
22	8	6	5	12	10	8	8	13
24	7	6	4	10	8	7	7	11

Repti-glo 8.0



All readings are in $\mu\text{W}/\text{cm}^2$

	1	2	3	4	5	6	7	8
Distance in inches	Tube	5mm mesh no reflector	Fly screen no reflector	Reflector	5mm mesh + reflector	fly screen + reflector	flat tin foil reflector	curved tinfoil reflector
2	118	107	75	232	177	140	118	185
4	63	61	42	134	100	78	63	100
6	46	43	29	89	65	51	46	67
8	35	31	21	61	49	37	35	50
10	29	24	17	48	38	30	29	40
12	22	19	14	39	30	24	23	32
14	18	16	11	33	25	20	19	26
16	15	14	9	27	20	16	16	22
18	13	11	8	23	18	14	13	19
20	11	9	7	20	14.5	12	11	16
22	10	8.5	6	17	13	10	10	14
24	9	7	5.5	15	11	9	9	12

Conclusions and additional findings not shown above

- Both Repti-glo 8.0 and Zoomed 5.0 bulbs provide similar output across the whole UVB range. Zoomed slightly higher but not significantly. Hagen recommends their 8.0 light be used with a 2.0 for full spectrum light and suitable light intensity.
- Spectral Power graphs need to be reviewed to establish relative UVB-D levels of each tube. Reports from the USA recommend Zoo-med over all other strip lighting at the time this report was written. A reflector should be used on all lights
- The common practice of putting lights outside of mesh enclosures should be stopped (or lights doubled up). Mesh blocks significant levels of UVB. Where possible, all lights should be inside the enclosure with nothing between the animal and the light.
- Tube length is important. All tubes should be as big as the enclosure will allow (see table below and note the Reptiglo is only a 15 inch 14W tube). Both 24inch tubes produce over twice the UVB compared to the 15inch tube
- UVB drops off rapidly as the distance from the tube increases.
- Plants absorb UV light. Heavily planted enclosures can stop UVB reaching the animal.
- Areas designed for UVB exposure should be free from plants and cage furniture to ensure maximum UVB exposure.
- Significant UVB is produced within 2 inches of the bulb. Thought should be given about the possibility of eye damage within this area for certain species that are used to lower UVB levels. Whilst UVB is much higher in their natural habitat there is little danger of the animal looking directly into the sun. A bulb 2 inches away is more likely to be looked at.

	Repti-glo 5.0	Zoomed 5.0	Repti-glo 5.0
Distance	15in 14w	24in 18w	24in 18w
2	86	233	186
4	43	136	107.5
6	26	87	70
8	19	64	49
10	14	48	37
12	11	37	29
14	9	30	23
16	7	25	19
18	6	21	16
20	5	18	14
22	5	16	12
24	5	14	10

Note: All tubes measured using a reflector

Suggested use of Reflectors

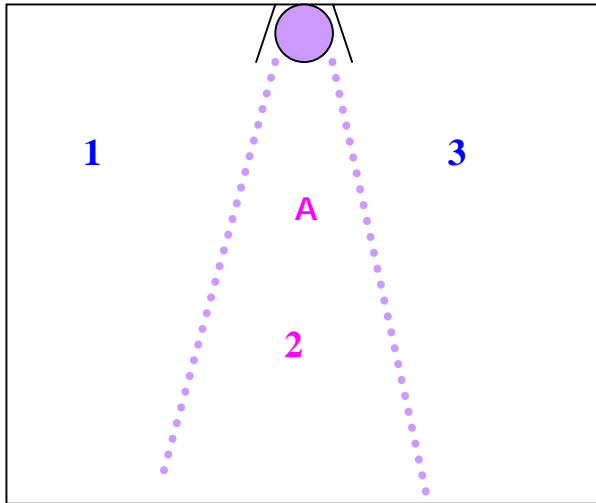


Fig 1

The standard reflector concentrates the UVB in a small area. This is suitable for terrestrial reptiles but not arboreal ones.

Area 2 has a good level of UVB, areas 1 and 3 have little exposure yet clearly arboreal species would spend time in both 1 and 3.

At 6 inches UVB at A was 50

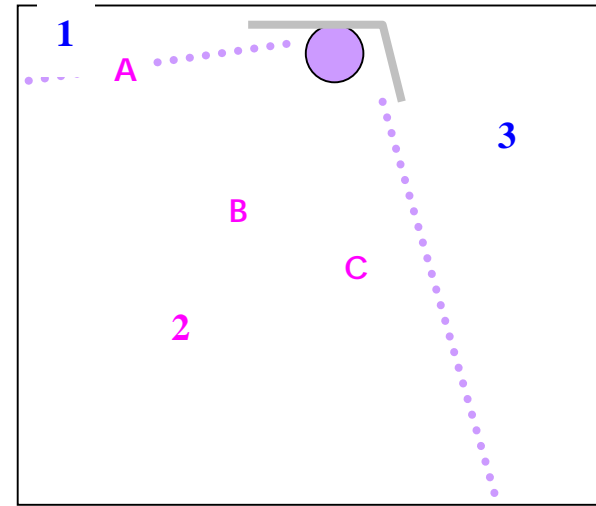


Fig 2

Several levels of tinfoil were folded and angled so the uv would be directed towards the area the reptile would be in. In this case a chameleon.

At 6 inches the readings were as follows: A 30, B 47, C 45, where B and C are comparable to Figure 1