Simple UVB Spread Charts for Fluorescent Tubes, for Home Use

A while ago, I uploaded a file (Make Yourself a Simple UVB Spread Chart.doc) describing a simple method of recording UVB output in the form of a 2-dimensional chart, representing a cross section of the three-dimensional "cone" of light put out by a hanging lamp such as a Megaray.

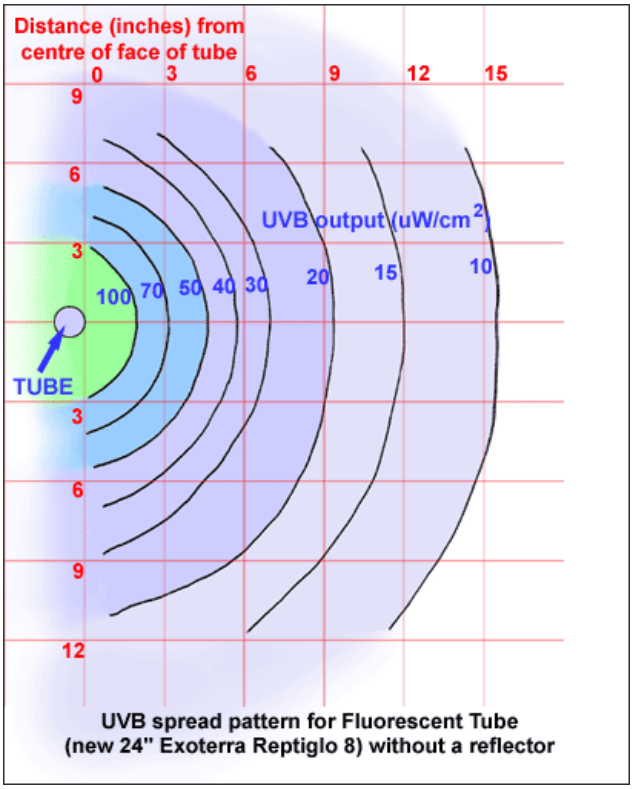
I've now done similar recordings for UVB fluorescent tubes, and these results provide an interesting way of visualising the spread of UVB light from a tube in a vivarium, with or without the use of a fitted reflector.

The tube I used to measure UVB output for this diagram was a new 24" Exoterra Reptiglo 8.0 which had been in use for 14 hours. The fixture used was an Arcadia AC18 external ballast for an 18 watt tube, with cables and end caps. These are standard aquarium/vivarium tube starters used widely in the UK.

I took readings in a similar way to that described in the previous file, using a Solarmeter 6.2 UVB meter, a measuring rule with a spirit level, and a large sheet of card. Because the shape of a fluorescent tube means that it will put out what might be described as a "cylinder" of ultraviolet light, and I wanted to map the cross section of that cylinder, I fixed the tube to a wall, and set the card at right angles to it, a convenient distance away. (See photograph below.) I was then able to plot the readings on the card.

In the photograph you can see a reading of 37uW/cm^2 on the meter. This picture was taken while I was mapping the 40uW/cm^2 range… in this case I'd need to move the meter fractionally closer to the tube, whereupon the meter would read 40 and I would mark the chart at the corresponding point.

The photograph shows the tube being tested whilst fitted with a simple reflector. This is a typical lightweight polished aluminium reflector available for aquarium fluorescent tubes in the UK. They are held in place by plastic clips. The model used is manufactured by Arcadia. I plotted the spread chart for this fluorescent tube both with and without the reflector. The results are shown below.

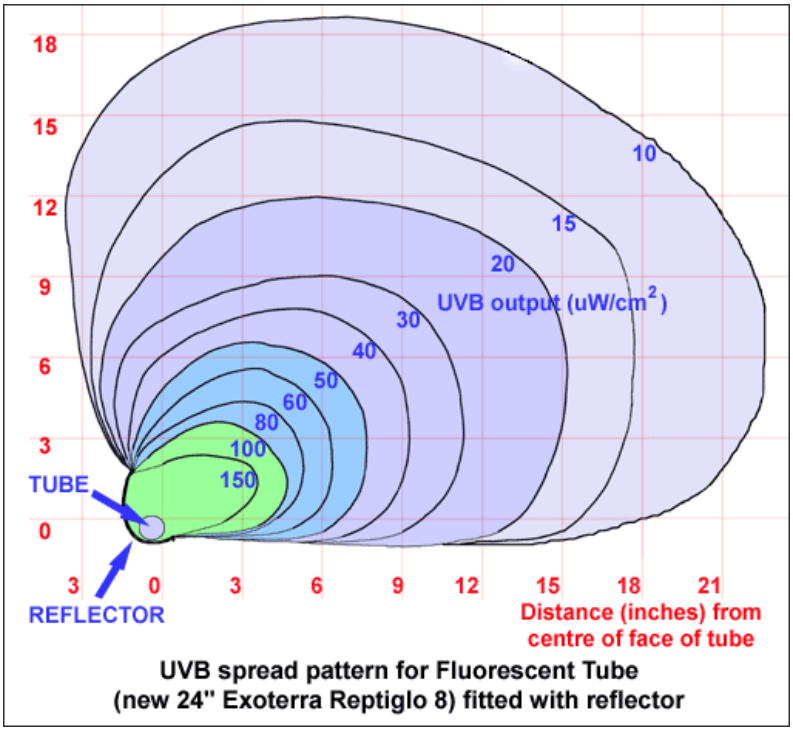


UVB spread pattern for Fluorescent Tube (new 24" Exoterra Reptiglo 8) without a reflector

This is the spread chart for the fluorescent tube without a reflector. The black lines are those which connect my measured data points; the coloured zones are extended purely to help visualise the pattern which could be seen.

At first glance it looks as if the chart shows concentric circles, and this is what might be expected from a cylinder emitting radiation uniformly from its surface. However the arcs slightly deviate away from the tube at the top and bottom of the chart. I believe this is due to a small amount of reflected UVB from the wall behind the tube, being picked up by the meter as it came closer to the wall above and below the tube.

We often mount our fluorescent tubes against walls in our vivaria so this effect would also occur outside of the “test” situation, though the colour and reflectivity of the wall would presumably determine how large the effect would be. I will test this in a future experiment!



UVB spread pattern for Fluorescent Tube (new 24" Exoterra Reptiglo 8) fitted with reflector

This is the spread chart for the same tube when fitted with a reflector. As expected, the reflector throws the light from the back of the tube forwards and creates a more intense beam of UVB light. The output of the tube is “shaped” into a flattened cylinder which puts useful UVB considerably further into the vivarium.

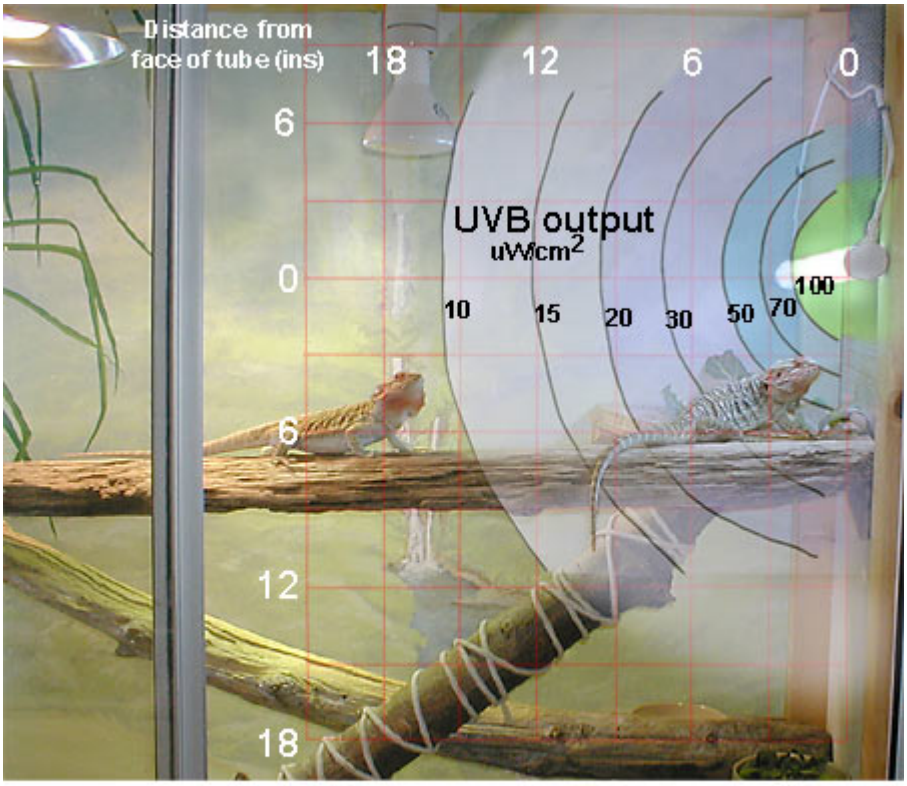
The reflector also confines the beam; the edge being particularly noticeable below the tube- the front edge of the reflector cuts off the beam completely.

In the vivarium it is possible to direct the beam by swivelling the clips holding

the reflector to the tube; the edge of the beam is easily seen in the visible light put out by the tube.

An example of Spread Charts used to visualise UVB output in the vivarium.

These are the spread charts above, used to show what the UVB would “look” like in a real set-up. By overlaying the graphic at the same scale as the photograph, you can get a good idea of the UVB exposure available. First, here is a tube in use without a reflector.

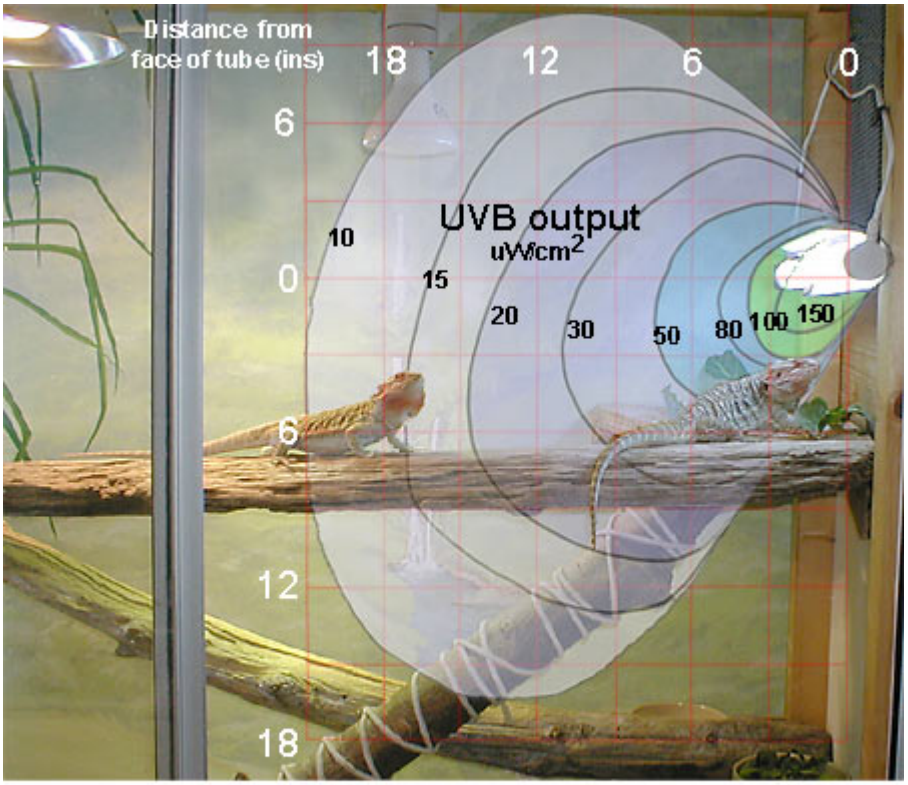


A visualisation of a typical UVB spread pattern for a Fluorescent Tube with no reflector, in the vivarium.

This visualisation is to scale, and is of a real set-up. The figures are from a new 24" Exoterra Reptiglo 8 tube.
The tube produces a three-dimensional "cylinder" of UVB radiation, seen here in cross-section.

The tube used to create the spread chart is not the exact same tube as the one in this vivarium photo. Of course every tube will produce a slightly different spread chart depending upon brand, size, and age of tube. But this shows clearly that if I were to use the tube I tested, the lizard eating greens close to the tube would receive a beneficial amount of UVB, but the one sitting under the ceramic heater, about 18” from the tube, would not.

Here is the same illustration, but with a reflector fitted to the UVB tube. By angling the reflector so the beam projects outward and slightly downward, it is possible to cover a greater area of the basking branch with useable amounts of UVB light.



A visualisation of a typical UVB spread pattern for a Fluorescent Tube fitted with a reflector, in the vivarium.

This visualisation is to scale, and is of a real set-up. The figures are from a new 24" Exoterra Reptiglo 8 tube.
The tube with the reflector produces a three-dimensional, somewhat flattened "cylinder" of UVB radiation, seen here in cross-section.

The second lizard is now receiving a basic maintenance level of UVB radiation from this new tube.

(I personally believe bearded dragons thrive under higher levels of UVB light than this, and I now use a Megaray mercury vapour lamp in this vivarium. However, before mercury vapour lamps became available I did use this set-up, with a second tube at the other end of this vivarium, to successfully house a breeding pair of bearded dragons for several years.)

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