Increasing growth rate of *Verruconis gallopava*, could it be one of the factors supporting its pathogenicity in warm blooded-animals?

K. Samerpitak^{1*}, A.H.G. Gerrits van den Ende² and G.S. de Hoog²

¹ Department of Microbiology, Faculty of Medicine, Khon Kaen University, Khon Kaen, Thailand

² Westerdijk Fungal Biodiversity Institute, Utrecht, the Netherlands

* Presenting author

Objectives

To investigate the growth rate behaviors of *V. gallopava* in varied temperatures.

Materials and Methods

1. Nineteen strains of *V. gallopava* were grown on malt extract agar (MEA) plates (90 mm in diam.) and incubated at 24°C for 14 d.
2. Preparation of the circular inocula (2 mm in diam.) by using a metallic puncture tube.
3. The inocula were grown in duplicate on MEA plates and incubated for 3 wk at the temperatures varied from 4 to 40°C with mostly 3°C interval.
4. Colony diameters were measured after incubation for 3, 7, 11, 14, 18, and 21 days.
5. The growth rates in all investigated temperatures were calculated and compared by Microsoft Excel and T-test.

Results

1. The growth of all *V. gallopava* strains could not be observed at the temperatures lower than 15°C (Fig 1).
2. The growth of colonies was significantly increased at 3°C interval in the range of 18 - 37°C, ($t \geq t_{\alpha 0.05}$) (Fig 1).
3. No significant difference of growth was detected between 9°C to 15°C, and 37°C to 40°C, ($t = t_{\alpha 0.05}$) (Fig 1).
4. The lowest growth rate was 0.01 mm/day at 15°C, and the highest was 6.20 mm/day at 37°C, and the growth increased depending on time and temperature at the average rate of 0.28 mm/day/°C (Table 1, Fig 2).
5. The differences of the growth rates compared between the low temperatures viz. 15°C, 18°C, 21°C, 24°C, 27°C, 30°C, 33°C and the higher temperatures showed an average growth rate of 354.2X, 21.1X, 6.9X, 2.9X, 1.7X, 1.4X and 1.1X, respectively (X = times) (Table 1).

Fig 1 Average colony diameters of *V. gallopava*, 19 strains, grown on MEA, at temperatures varied from 4°C to 40°C, after incubation for 3, 7, 11, 14, 18 and 21 days

References
1) Horré R et al. rDNA diversity and physiology of *Ochroconis* and *Scolecobasidium* species reported from humans and other vertebrates. Studies in Mycology 1999;43:194–205.
2) Samerpitak K et al. Taxonomy of *Ochroconis*, genus including opportunistic pathogens on humans and animals. Fungal Diversity 2014;65:89–126.

Conclusion

1. The growth ability of *V. gallopava* starts at 15°C and higher.
2. The growth rate was depending on both time and temperature, and the average rate was 0.28 mm/ day/°C.
3. The optimal growth of *V. gallopava* showed at temperatures between 37°C and 40°C.
4. The growth rate profile of the species could lead to hypothesize its growth and pathogenic behaviors as following;
a) The species could thrive in general environment with temperature ranging from 15°C to 40°C.
b) The species could grow faster in natural hot environments and also inside the bodies of warm-blooded animals.
c) The different temperature between the strain's niche and body of warm-blooded animals could accelerate the strain's growth rate and enhance animal tissue invasion leading to finally successful infection.

These hypotheses should have to be further investigated.

Table 1 Comparison of *V. gallopava* growth rates (GR) after incubations for 14 days at the temperatures varied from 15°C to 40°C

Temp.	GR (mm/day)	GR at higher temp. / GR at lower temp. (X (times)), when the lower ones are ;							
		15°C	18°C	21°C	24°C	27°C	30°C	33°C	37°C
4°C	0.00	No growth							
9°C	0.00	No growth							
15°C	0.01								
18°C	0.19	18.93							
21°C	0.66	65.98	3.47						
24°C	1.75	175.18	9.22	2.65					
27°C	3.39	338.93	17.84	5.14	1.94				
30°C	4.37	436.79	22.99	6.62	2.50	1.29			
33°C	5.59	559.46	29.45	8.48	3.20	1.65	1.28		
37°C	6.20	620.00	32.63	9.39	3.54	1.83	1.42	1.11	
40°C	6.19	618.57	32.56	9.37	3.53	1.82	1.42	1.11	1.00
Average (15-40°C)	3.15	354.23	21.16	6.94	2.94	1.65	1.37	1.11	1.00

Fig 2 Growth rates (GR) of *V. gallopava* at the temperatures varied from 4°C to 40°C, after incubations for 14 days