

**SUPPLEMENTAL INFORMATION**

**DEVELOPMENT AND VALIDATION OF A SCORING SYSTEM FOR  
ABNORMALITIES IN THE GOPHER FROG (*RANA CAPITO*)**

*KIERSTEN N. NELSON, ADAM J. MCFALL, E. TUCKER STONECYPHER, CHRISTIAN S.  
SWARTZBAUGH, MATTHEW C. ALLENDER, AND STACEY L. LANCE*

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**TABLE S1.** Inter-rater agreement of the Gopher Frog (*Rana capito*) developmental abnormalities scoring system using images assessed by raters with different degrees of expertise

<b>Condition</b>	<b>Group</b>	<b>ICC single (95% CI)</b>	<b>ICC average (95% CI)</b>
<b>Cutaneous hypopigmentation</b>	Graduate Students	0.81 (0.75–0.87)	0.98 (0.97–0.99)
	Specialists	0.80 (0.70–0.87)	0.97 (0.94–0.98)
	All Raters	0.80 (0.73–0.86)	0.99 (0.99–0.99)
<b>Microphthalmia</b>	Graduate Students	0.93 (0.90–0.96)	0.99 (0.99–0.99)
	Specialists	0.93 (0.90–0.96)	0.99 (0.99–0.99)
	All Raters	0.93 (0.90–0.96)	0.99 (0.99–0.99)
<b>Brachygnathia</b>	Graduate Students	0.96 (0.93–0.98)	0.99 (0.99–0.99)
	Specialists	0.96 (0.94–0.98)	0.99 (0.99–0.99)
	All Raters	0.96 (0.93–0.98)	0.99 (0.99–0.99)
<b>Edema</b>	Graduate Students	0.83 (0.75–0.90)	0.98 (0.97–0.99)
	Specialists	0.63 (0.49–0.77)	0.92 (0.87–0.96)
	All Raters	0.75 (0.65–0.85)	0.98 (0.97–0.99)
<b>Gill retention</b>	Graduate Students	0.87 (0.80–0.93)	0.99 (0.98–0.99)
	Specialists	0.89 (0.83–0.94)	0.98 (0.97–0.99)
	All Raters	0.88 (0.82–0.93)	0.99 (0.99–0.99)

Intraclass correlation coefficient (ICC) estimates and their 95% confidence intervals (95% CI) were calculated based on single measures (ICC single) and average (ICC average) of measures (raters: n = 7 for specialist group, n = 11 for graduate student group, n = 18 for all raters), using two-way random effects model for absolute agreement.

**TABLE S2.** Intra-rater agreement of the gopher frog developmental abnormalities scoring system using images assessed by raters with different degrees of expertise

<b>Condition</b>	<b>Group</b>	<b>ICC single (95% CI)</b>	<b>ICC average (95% CI)</b>
<b>Cutaneous hypopigmentation</b>	Graduate Students	0.86 (0.77–0.93)	0.99 (0.99–0.99)
	Specialists	0.84 (0.74–0.92)	0.99 (0.98–0.99)
	All Raters	0.85 (0.76–0.93)	0.99 (0.99–0.99)
<b>Microphthalmia</b>	Graduate Students	0.93 (0.87–0.97)	0.99 (0.99–0.99)
	Specialists	0.94 (0.88–0.98)	0.99 (0.99–0.99)
	All Raters	0.93 (0.87–0.97)	0.99 (0.99–0.99)
<b>Brachygnathia</b>	Graduate Students	1.00 (1.00–1.00)	1.00 (1.00–1.00)
	Specialists	1.00 (1.00–1.00)	1.00 (1.00–1.00)
	All Raters	1.00 (1.00–1.00)	1.00 (1.00–1.00)
<b>Edema</b>	Graduate Students	0.90 (0.80–0.97)	0.99 (0.99–0.99)
	Specialists	0.77 (0.58–0.93)	0.98 (0.95–0.99)
	All Raters	0.85 (0.72–0.95)	0.99 (0.99–0.99)
<b>Gill retention</b>	Graduate Students	0.89 (0.78–0.97)	0.99 (0.99–0.99)
	Specialists	0.93 (0.86–0.98)	0.99 (0.99–0.99)
	All Raters	0.91 (0.81–0.97)	0.99 (0.99–0.99)

Intraclass correlation coefficient (ICC) estimates and their 95% confidence intervals (95% CI) were calculated based on single measures (ICC single) and average (ICC average) of measures (raters: n = 7 for specialist group, n = 11 for graduate student group, n = 18 for all raters), using two-way mixed effects model for absolute agreement.

**TABLE S3.** Agreement between all raters and the benchmark standard given as ICC single and ICC average values

<b>Agreement</b>	<b>Each rater versus the benchmark</b>	
	<b>standard % (N)</b>	
	<b>ICC single</b>	<b>ICC average</b>
<b><i>Cutaneous hypopigmentation</i></b>		
Poor (0.00–0.50)	0% (0)	0% (0)
Moderate (0.50–0.75)	6% (1)	0% (0)
Good (0.75–0.90)	67% (12)	28% (5)
Excellent (0.90–1.00)	28% (5)	72% (13)
<b><i>Microphthalmia</i></b>		
Poor (0.00–0.50)	0% (0)	0% (0)
Moderate (0.50–0.75)	0% (0)	0% (0)
Good (0.75–0.90)	6% (1)	0% (0)
Excellent (0.90–1.00)	94% (17)	100% (18)
<b><i>Brachygnathia</i></b>		
Poor (0.00–0.50)	0% (0)	0% (0)
Moderate (0.50–0.75)	0% (0)	0% (0)
Good (0.75–0.90)	0% (0)	0% (0)
Excellent (0.90–1.00)	100% (18)	100% (18)
<b><i>Edema</i></b>		
Poor (0.00–0.50)	0% (0)	0% (0)
Moderate (0.50–0.75)	17% (3)	6% (1)

Good (0.75–0.90)	50% (9)	28% (5)
Excellent (0.90–1.00)	33% (6)	67% (12)

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***Gill retention***

Poor (0.00–0.50)	0% (0)	0% (0)
Moderate (0.50–0.75)	11% (2)	6% (1)
Good (0.75–0.90)	6% (1)	11% (2)
Excellent (0.90–1.00)	83% (15)	83% (15)

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The table shows the proportion of all raters (n = 18) (in % and number) in different levels of ICC value agreement (Koo and Li 2016).

**TABLE S4.** Percentage matched scores between raters and the benchmark standard for all conditions. The scores from the benchmark standard are in columns, the scores from raters are in rows, and bold is used to indicate where scores matched.

<b>Scoring by benchmark standard</b>				
<i>Cutaneous Hypopigmentation</i>				
Scoring by raters	0	1	2	3
0	<b>95</b>	20	2	0
1	3	<b>63</b>	16	3
2	1	17	<b>70</b>	33
3	0	1	12	<b>63</b>
<i>Microphthalmia</i>				
	0	1	2	
0	<b>99</b>	3	0	
1	1	<b>97</b>	9	
2	0	0	<b>91</b>	
<i>Brachygnathia</i>				
	0	1		
0	<b>99</b>	1		
1	1	<b>99</b>		
<i>Edema</i>				

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	0	1
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0	<b>94</b>	9
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1	6	<b>91</b>
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*Gill Retention*

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	0	1
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0	<b>94</b>	1
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1	6	<b>99</b>
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**TABLE S5.** Definitions, descriptions, and photographic examples for the initial and finalized scoring model of cutaneous hypopigmentation for Gopher Frogs (*Rana capito*). Photographs were cropped and lightened as needed to enhance contrast. (Photographed by Christian Swartzbaugh).

Initial Score	Initial Description	Finalized Score	Final Description	Example Photographs Lateral View	Dorsal View
0	No abnormalities present. Skin appears to have developed normally.	0	No abnormalities present. Skin appears to have developed normally.		
1	Affected skin (clear/ gray pigmentation) appears to only surround the front limb.	1	Affected skin (clear/ gray pigmentation) appears to only surround the front limb.		
2	Affected skin (clear/ gray pigmentation) appears to surround the front limb	2	Affected skin (clear/ gray pigmentation) appears to surround the front limb,		



and continues down the lateral surface.

Affected skin (clear/ gray pigmentation) appears to surround the front limb, run down the lateral surface and continues onto the dorsal surface.

3

run down the lateral surface and may continue onto the dorsal surface.

Includes example photographs for the initial scores of 2 and 3.

