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DATA REPOSITORY

Figure DR1. *Rhizocorallium commune* var. *auriforme* from the Lower and Middle Triassic successions, South China.

Figure DR2. *Rhizocorallium commune* var. *auriforme* and *R. jenense* from the Middle Triassic, South China.

Figure DR3. *Rhizocorallium commune* var. *irregularare* from the Lower Triassic, South China.

Figure DR4. *Rhizocorallium commune* var. *irregularare* and *Rhizocorallium* isp. 5 from the Middle Triassic, South China.

Figure DR5. *Rhizocorallium* isp. 1, *Rhizocorallium* isp. 2, and *Rhizocorallium* isp. 3, from the Lower and Middle Triassic, South China.

Figure DR6. Plot diagram of tube diameter vs burrow width (TD/BW) of various ichnospecies of *Rhizocorallium* from ten studied sections and literature collected from the Lower to Middle Triassic successions.

Table DR1. Detailed stratigraphic and geographical distributions, depositional settings, and bioturbation levels (ii, bpbi) of host rocks of *Rhizocorallium* ichnospecies recorded from the Griesbachian to the Pelsonian from around the world.

Table DR2. Detailed measurements of additional *Rhizocorallium* burrows of Lower and Middle Triassic successions both from South China and elsewhere in the world.

Figure DR1. A–B, *R. commune* var. *auriforme* from Guanling Formation, QZ. C, Slightly inclined *R. commune* var. *auriforme* from the Member II of the Guanling Formation, BY. D, *R. commune* var. *auriforme* from the Jialingjiang Formation, LC. E–F *R. commune* var. *auriforme* from the Guanling Formation, TSQ. G, Small U-shaped *R. commune* var. *auriforme* from the Daye Formation, DXK. H, *R. commune* var. *auriforme* from the Member II of the Guanling Formation, Luoping Forest Park of LP.

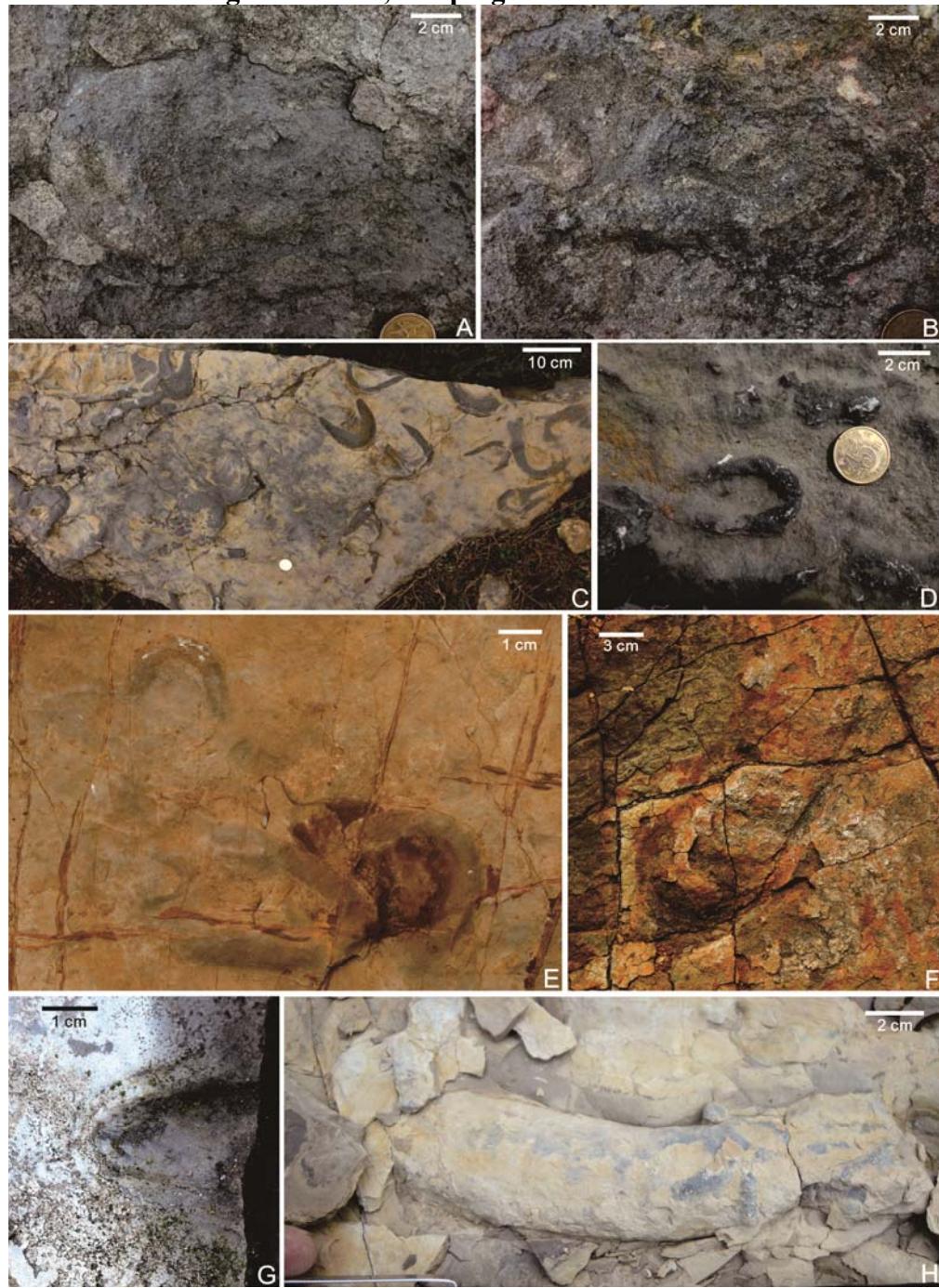


Figure DR2. A–C, *R. commune* var. *auriforme* from Guanling Formation, QZ. D–H, Abundant *R. jenense* burrows from the Member II of the Guanling Formation, BY.



Figure DR3. A–B, Long *R. commune* var. *irregularare* burrows from the upper surface of the beds of the Nanlinghu Formation, SS. C–H, Horizontal, long *R. commune* var. *irregularare* from the upper part of the Anshun Formation, GM.

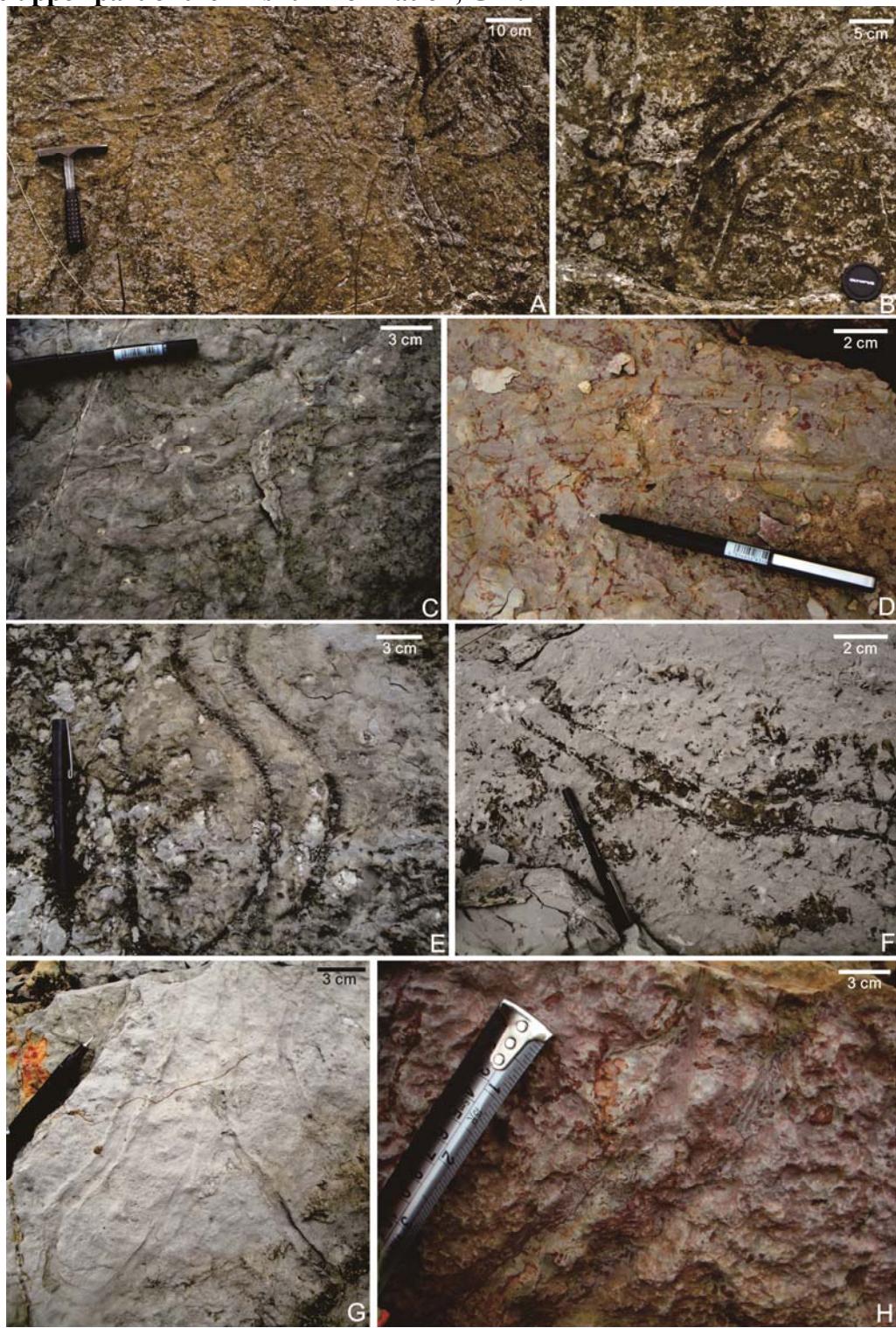


Figure DR4. A–D, Robust, long, and horizontal *R. commune* var. *irregularare* burrows from the Member II of the Guanling Formation, LP (No. 1 quarry). E–F, *R. isp.* 5 from the Guanling Formation, QZ, abundant bivalve fossils (white arrows) preserved together with *R. isp.* 5 in F. G–H, *Rhizocorallium* *isp.* 5 from the Member II of the Guanling Formation, Luoping Forest Park site of LP.

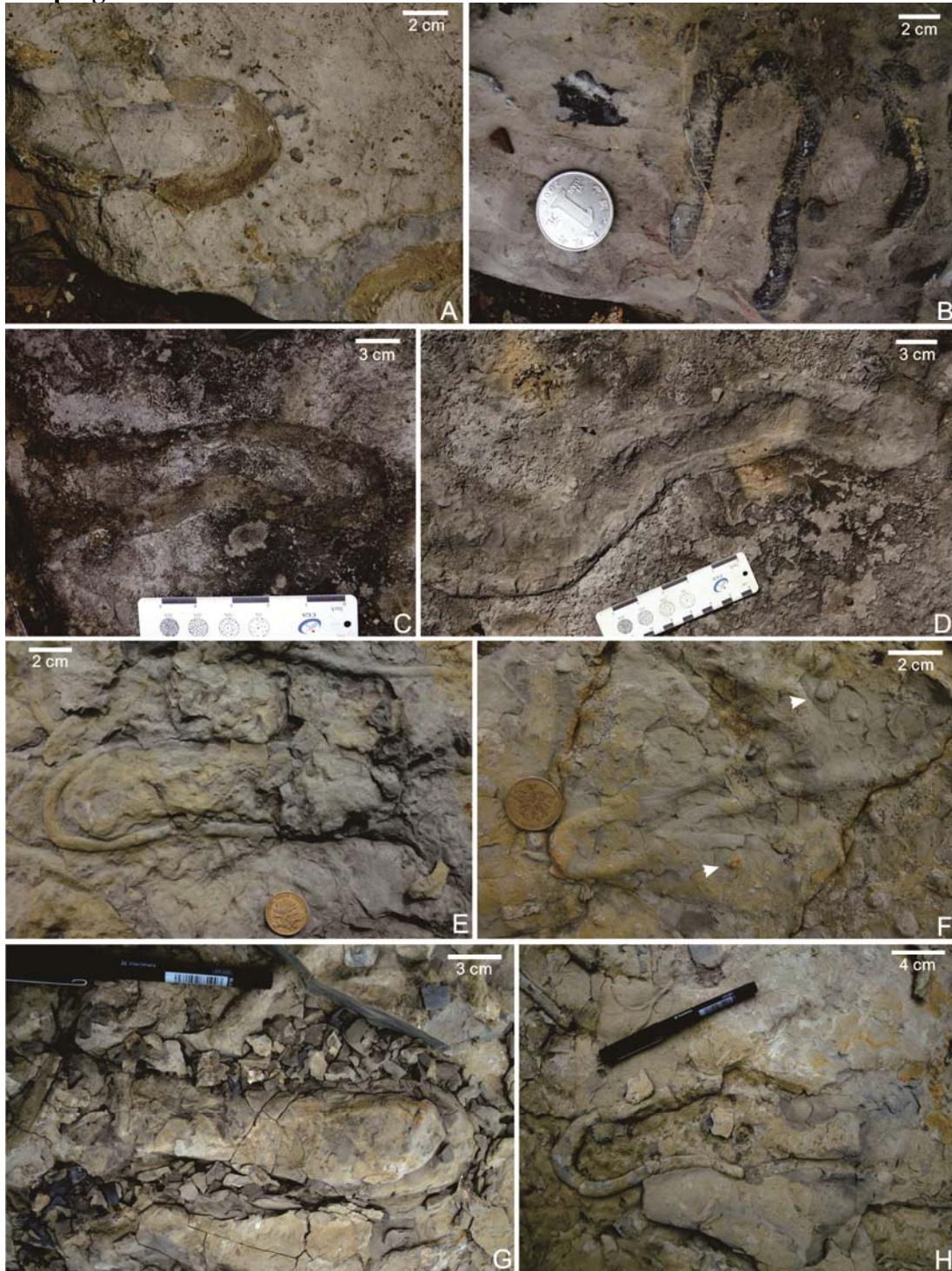


Figure DR5. A–C, Horizontal, winding *Rhizocorallium* isp. 1, from the basal Guanling Formation, GM. B is viewed in vertical plane direction, GM. D, Branching *Rhizocorallium* isp. 3 burrows from the Member II of the Guanling Formation, LP (No. 1 quarry). E–F, *Rhizocorallium* isp. 2, from the Jialingjiang Formation, DXK. G, R. isp. 2, from the Anshun Formation, GM. H, R. isp. 2, from the Guanling Formation, TC.

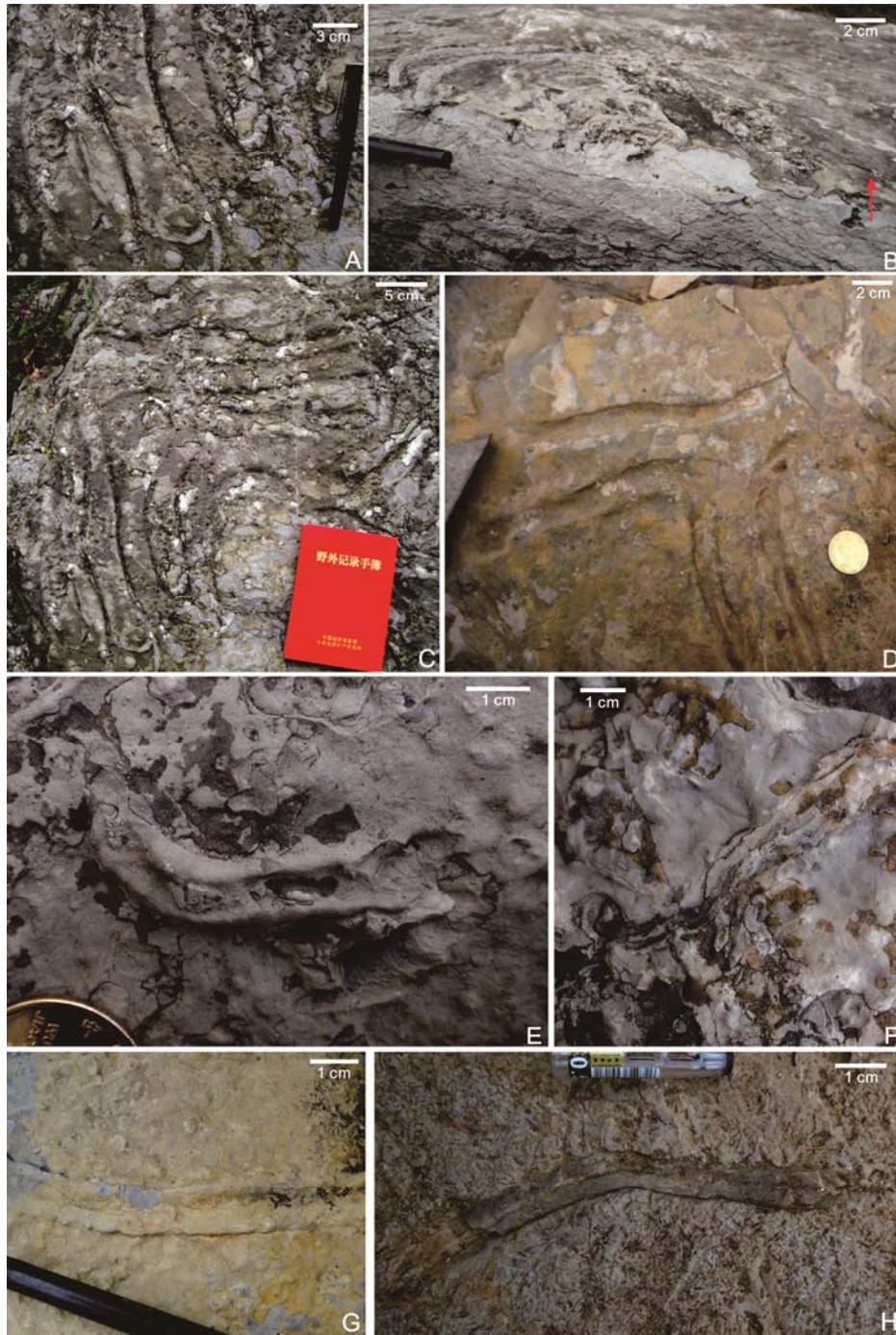


Figure DR6. Plot diagram of tube diameter vs burrow width (TD/BW) of various ichnospecies of *Rhizocorallium* from ten studied sections and literature collected from the Lower to Middle Triassic successions.

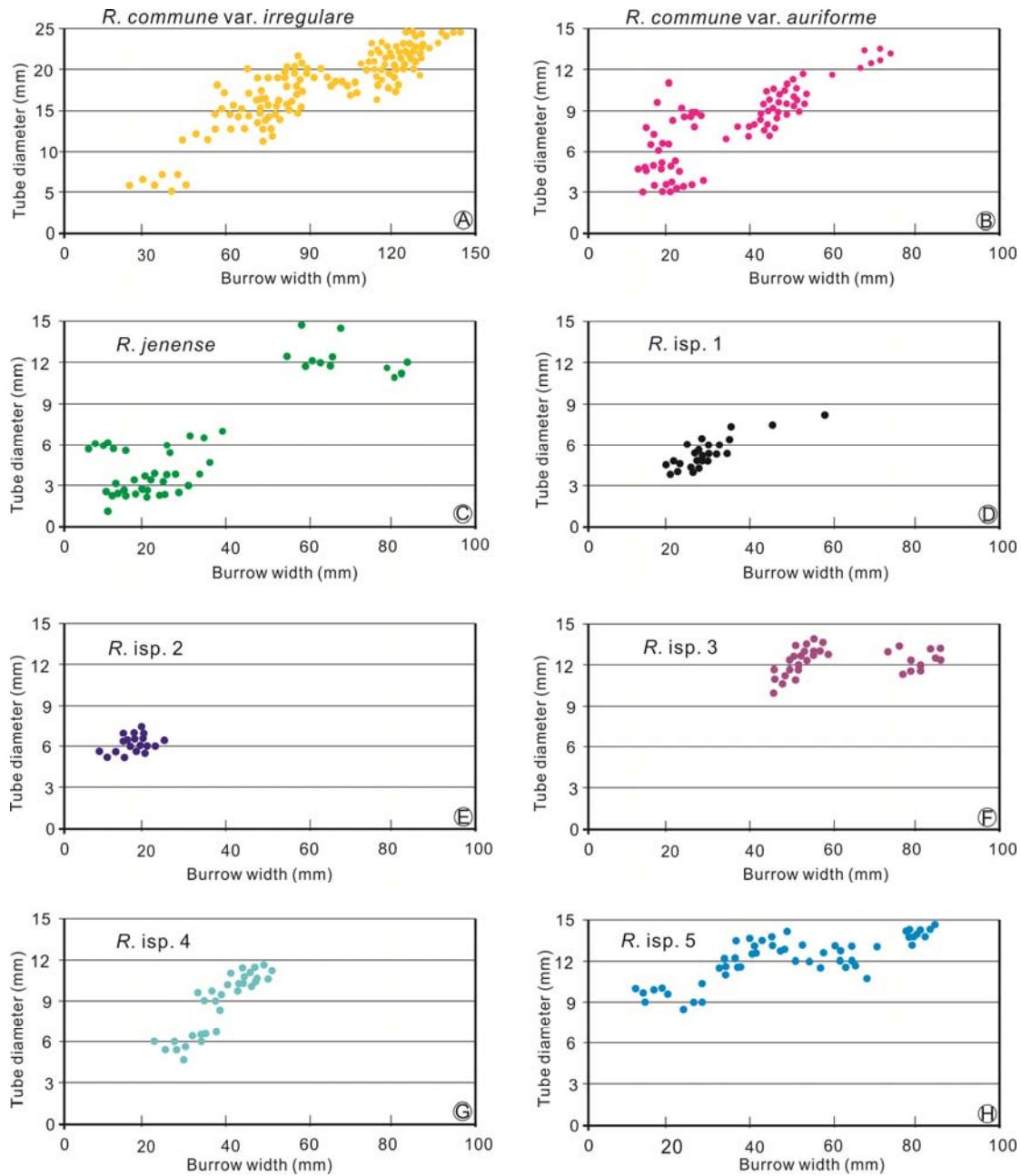


TABLE DR1. DETAILED STRATIGRAPHICAL AND GEOGRAPHICAL DISTRIBUTIONS, DEPOSITIONAL SETTINGS, AND BIOTURBATION LEVELS (II, BPBI) OF HOST ROCKS OF *RHIZOCORALLIUM* ICHNOSPECIES RECORDED FROM THE GRIESBACHIAN TO THE PELSONIAN FROM AROUND THE WORLD

Ichnotaxa	Original designation	Stratigraphic units	Ages	Localities	No. in Fig. 8	II, BPBI	Settings	Principal references
<i>R. jenense</i>	<i>R. isp.</i>	Montney Fm	Griesbachian	British Columbia, Canada	2	ii: 5, bpbi: 4–5	offshore transition	Zonneveld et al. (2010)
<i>R. jenense</i>	<i>Diplocraterion</i> <i>isp.</i>	Moenkopi Fm	Spathian	Nevada, USA	6	ii: 2, bpbi: 3–4	lower shoreface	Mata and Bottjer (2011)
<i>R. jenense</i>	<i>R. isp.</i>	Werfen Fm	Spathian	Dolomites, north Italy	3	ii: 2, bpbi: 3–4	inner ramp	Twitchett and Wignall (1996)
<i>R. jenense</i>	<i>R. jenense</i>	Upper Buntsandstein	early Anisian	Hausberg near Jena, Germany	4	bpbi: 4–5	upper shoreface	Knaust (2013)
<i>R. jenense</i>	<i>R. jenense</i>	Lower Muschelkalk	middle–late Anisian	Hausberg near Jena, Germany	4	bpbi: 4–5	offshore	Knaust (2013)
<i>R. jenense</i>	<i>R. jenense</i>	Lower Muschelkalk	middle–late Anisian	Southwestern Poland	17	bpbi: 4–5	mid-ramp	Chrzastek (2013)
<i>R. jenense</i>	<i>R. isp.</i>	Nanlinghu Fm	Spathian	Yashan, South China	8	ii: 5, bpbi: 5	lower shoreface	Chen et al. (2011); this study (Fig. 3B)
<i>R. jenense</i>	<i>R.. isp</i>	Virgin Fm	early Spathian	Utah, USA	5	ii: 5, bpbi: 5	inner ramp	Hofmann et al. (2015)
<i>R. jenense</i>		Guanling Fm	middle Anisian	Boyin, South China	21	ii: 5, bpbi: 5	lagoon	This study (Figs. S2D–H, 3A)
<i>R. jenense</i>		Jialingjiang Fm	Spathian	Tianshengqiao, South China	20	ii: 3, bpbi: 5	lagoon	This study (Fig. 3C)
<i>R. commune</i> var. <i>irregularare</i>	<i>R. isp.</i>	Werfen Fm	Griesbachian	Dolomites, north Italy	3	ii: 2, bpbi: 3–4	inner ramp	Hofmann et al. (2011)
<i>R. commune</i> var. <i>irregularare</i>	<i>Rhizocorallium</i>	Moenkopi Formation	Smithian	Utah, USA	5	ii: 2, bpbi: 3–4	offshore	Fraiser and Bottjer (2009)
<i>R. commune</i> var. <i>irregularare</i>	<i>R. irregularare</i>	Bravaisberget Fm	middle–late Anisian	Svalbard, Norway	11	bpbi: 3–4	offshore	Mørk and Bromley (2008)
<i>R. commune</i> var. <i>irregularare</i>	<i>R. isp.</i>	Lužna Fm	Anisian–Ladinian	Tatra Mts, Poland	15	bpbi: 4–5	mid-ramp	Jaglarz and Uchman (2010)
<i>R. commune</i> var. <i>irregularare</i>	<i>R. commune</i> var. <i>irregularare</i>	Lower Muschelkalk	middle–late Anisian	Southwestern Poland	17	bpbi: 4–5	mid-ramp	Chrzastek (2013)
<i>R. commune</i> var. <i>irregularare</i>	<i>R. commune</i>	Punta del Lavatoio Fm	Anisian–Ladinian	Sardinia, Italy	13		mid-ramp	Knaust and Costamagna (2012)
<i>R. commune</i> var. <i>irregularare</i>	<i>R. jenense</i>	Anshun Fm	Spathian	Huaxi, South China	10	ii: 5	lagoon	Shi et al. (2015)
<i>R. commune</i> var. <i>irregularare</i>	<i>R. commune</i>	Anshun Fm	Spathian	Huaxi, South China	10	ii: 5	lagoon	Shi et al. (2015)
<i>R. commune</i> var. <i>irregularare</i>	<i>R. commune</i> var. <i>irregularare</i>	Upper Muschelkalk	middle–late Anisian	Thuringia, Germany	14	bpbi: 4–5	inner ramp	Knaust (2013)
<i>R. commune</i> var. <i>irregularare</i>	<i>R. commune</i> var. <i>irregularare</i>	Upper Buntsandstein	early Anisian	Hausberg near Jena, Germany	14	bpbi: 4–5	upper shoreface	Knaust (2013)
<i>R. commune</i> var. <i>irregularare</i>	<i>R. commune</i> var. <i>irregularare</i>	Lower Muschelkalk	middle–late Anisian	Hausberg near Jena, Germany	14	bpbi: 4	inner ramp	Knaust (2013)
<i>R. commune</i> var. <i>irregularare</i>		Nanlinghu Fm	Spathian	Susong, South China	9	bpbi: 5	lower shoreface	This study (Fig. S3A–B)
<i>R. commune</i> var. <i>irregularare</i>		Guanling Fm	middle–late Anisian	Luoping, South China	22	ii: 4, bpbi: 4–5	lagoon	This study (Figs. 5E–H, 6A–B, S4A–D)
<i>R. commune</i> var. <i>irregularare</i>		Guanling Fm	middle–late Anisian	Boyin, South China	21	ii: 4, bpbi: 4–5	lagoon	This study (Fig. 4A, C)
<i>R. commune</i> var. <i>irregularare</i>		Anshun Fm	Spathian	Gaimao, South China	19	ii: 4, bpbi: 4–5	lagoon	This study (Figs. S3C–H, 4B,D–E, 5A–D)
<i>R. commune</i> var. <i>irregularare</i>		Ra'af Fm	Pelsonian (middle–late Anisian)	south Israel, Levant Basin	12	ii: 4–5, bpbi: 4–5	mixed	(Korngreen and Bialik, 2015)
<i>R. commune</i> var. <i>auriforme</i>	<i>Rhizocorallium</i>	Moenkopi Fm	Spathian	Nevada, USA	6	ii: 2, bpbi: 3–4	lower shoreface	Mata and Bottjer (2011); Zonneveld et al. (2012)
<i>R. commune</i> var. <i>auriforme</i>	<i>R. isp.</i>	Moenkopi Fm	Smithian	Utah, USA	5	ii: 2, bpbi: 3–4	offshore	Fraiser and Bottjer (2009)
<i>R. commune</i> var. <i>auriforme</i>	<i>R. jenense</i>	Werfen Fm	Spathian	Dolomites, northern Italy	3	ii: 2, bpbi: 3–4	inner ramp	Twitchett and Wignall (1996)
<i>R. commune</i> var. <i>auriforme</i>		Twillingodden Fm	Spathian	Western Spitsbergen	1	ii: 2, bpbi: 3–4	shoreface	Worsley and Mørk (2001)
<i>R. commune</i> var. <i>auriforme</i>	<i>R. commune</i>	Punta del Lavatoio Fm	Anisian–Ladinian	Sardinia, Italy	13		mid-ramp	Knaust and Costamagna (2012)
<i>R. commune</i> var. <i>auriforme</i>	<i>R. jenense</i>	Daye Fm	Spathian	Huaxi, South China	10		mid-ramp	Luo et al. (2007)
<i>R. commune</i> var. <i>auriforme</i>	<i>Rhizocorallium</i>	Biadanshan Fm	Spathian	Susong, South China	9		mid-ramp	Liu and Wang (1990)
<i>R. commune</i> var. <i>auriforme</i>	<i>R. commune</i> var. <i>auriforme</i>	Lower Muschelkalk	middle–late Anisian	Winterswijk, Netherlands	16	ii: 4, bpbi: 4–5	inner ramp	Knaust (2013)
<i>R. commune</i> var. <i>auriforme</i>	<i>R. commune</i> var. <i>auriforme</i>	Lower Muschelkalk	middle–late Anisian	Southwestern Poland	17	ii: 4, bpbi: 4–5	mid-ramp	Chrzastek (2013)
<i>R. commune</i> var. <i>auriforme</i>	<i>R. commune</i> var. <i>auriforme</i>	Lower Muschelkalk	middle–late Anisian	Plaue, Germany	14	bpbi: 4–5	inner ramp	Knaust (2013)
<i>R. commune</i> var. <i>auriforme</i>		Jialingjiang Fm	Spathian	Lichuan, South China	7	ii: 4, bpbi: 4	mid-ramp	This study (Fig. S1D)
<i>R. commune</i> var. <i>auriforme</i>		Daye Fm	Spathian	Daxiakou, South China	18	ii: 4, bpbi: 4	mid-ramp	This study (Fig. S1G)
<i>R. commune</i> var. <i>auriforme</i>		Guanling Fm	middle Anisian	Luoping, South China	22	ii: 5, bpbi: 5	lagoon	This study (Fig. 3E, S1H)
<i>R. commune</i> var. <i>auriforme</i>		Guanling Fm	middle Anisian	Boyin, South China	21	ii: 5, bpbi: 5	lagoon	This study (Fig. 3F–H, S1C)
<i>R. commune</i> var. <i>auriforme</i>		Guanling Fm	middle–late Anisian	Tianshengqiao, South China	20	ii: 4, bpbi: 4	lagoon	This study (Fig. S1E–F)
<i>R. commune</i> var. <i>auriforme</i>		Guanling Fm	early Anisian	Qingzhen, South China	23	ii: 3, bpbi: 5	lagoon	This study (Figs. S1A–B, S2A–C, 3D)
<i>R. isp. 1</i>		Guanling Fm	Spathian	Gaimao, South China	19	ii: 4, bpbi: 4–5	lagoon	This study (Figs. 7A–D, S5A–C)
<i>R. isp. 2</i>		Jialingjiang Fm	Spathian	Daxiakou, South China	18	ii: 4, bpbi: 4	mid-ramp	This study (Figs. 6G–H, S5E–F)
<i>R. isp. 2</i>		Anshun Fm	Spathian	Huaxi, South China	19	ii: 5, bpbi: 5	lagoon	This study (Fig. S5G)
<i>R. isp. 2</i>		Guanling Fm	middle–late Anisian	Tucheng, South China	24	ii: 5, bpbi: 5	lagoon	This study (Fig. S5H)
<i>R. isp. 2</i>	<i>Rhizocorallium</i> <i>isp.</i>	Nanlinghu Fm	Spathian	Yashan, South China	8	ii: 4, bpbi: 4–5	lower shoreface	Chen et al. (2011)
<i>R. isp. 3</i>		Guanling Fm	middle–late Anisian	Luoping, South China	22	ii: 5, bpbi: 4–5	lagoon	This study (Figs. 7E–G, S5D)
<i>R. isp. 4</i>		Guanling Fm	middle–late Anisian	Luoping, South China	22	ii: 5, bpbi: 5	lagoon	This study (Fig. 6E)
<i>R. isp. 4</i>		Anshun Fm	Spathian	Huaxi, South China	19	ii: 4, bpbi: 4	lagoon	This study (Fig. 6F)
<i>R. isp. 5</i>		Guanling Fm	middle Anisian	Luoping, South China	22	ii: 4, bpbi: 4–5	lagoon	This study (Figs. 6C, S4G–H)
<i>R. isp. 5</i>		Guanling Fm	middle–late Anisian	Qingzhen, South China	23	ii: 5, bpbi: 5	lagoon	This study (Figs. 6D, S4E–F)

TABLE DR2. DETAILED MEASUREMENTS OF ADDITIONAL *RHIZOCORALLIUM* BURROWS OF LOWER AND MIDDLE TRIASSIC SUCCESSIONS BOTH FROM SOUTH CHINA AND ELSEWHERE IN THE WORLD.

Ichnotaxa		<i>R. jenense</i>	<i>R. commune</i> var. <i>irregularare</i>	<i>R. commune</i> var. <i>auriforme</i>	<i>R. isp.</i> 1	<i>R. isp.</i> 2	<i>R. sp.</i> 3	<i>R. isp.</i> 4	<i>R. isp.</i> 5
Localities									
YS	tiering	5							
	TD	2							
	BW	8							
SS	tiering		0						
	TD		13						
	BW		63						
DXK	tiering			0		0			
	TD			5.6		6			
	BW			24		11			
LC	tiering			3					
	TD			8					
	BW			30					
TC	tiering				0				
	TD				4				
	BW				10				
GM	tiering	1			0	0		0	
	TD	8			4	4		11	
	BW	45			31	11		44	
QZ	tiering		4						2
	TD		18						10
	BW		71						43.1
LP	tiering	0	5				3	0	2
	TD	17	15				11.6	10	10.3
	BW	49	63				55	54	61
TSQ	tiering	4-6	5						
	TD	4	6.9						
	BW	8	28						
BY	tiering	3-4	5	6					
	TD	9	15	19					
	BW	36	70	74					
Germanic Basin	tiering	6	0	3					
	TD	6	12.3	4					
	BW	25	53.5	20					
Poland	tiering		0	0					
	TD	12	21	11					
	BW	60	68.6	35					
Utah, USA	tiering	5	4						
	TD	6	6						
	BW	20	47						
Nevada, USA	tiering	5		0					
	TD	6		10					
	BW	15		20					
South Spain	tiering		0						
	TD	9	14						
	BW	50	60						
Spitsbergen	tiering			5					
	TD			7					
	BW			40					
BC, Canada	tiering	6							
	TD	6							
	BW	10							
North Italy	tiering		0						
	TD		6						
	BW		33						

Tiering (in mm); TD = tube diameter (in mm); BW = burrow width (in mm), all data are mean value collected from the references and new data in Table 1.