**Supplementary Material 1** Physical description of Anjar intertrappean layers (and thereby samples)

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| **Layer/Sample** | **Thickness (cm)** | **Physical Propoerties of Layer** |
| SGA-17 | 30 | Limestone |
| SGA-16 | 20 | Intercalated shale and limestone with gypsum nodules |
| SGA-15 | 20 | Hard and compact limestone |
| SGA-14 | 9 | Black shale |
| SGA-13 | 20 | Hard and compact limestone |
| SGA-12 | 10 | Grey shale |
| SGA-11 | 40 | Limestone |
| SGA-10 | 2 | Shale (greyish white) |
| SGA-9 | 10 | Limestone with gypsum and shale occurrence |
| SGA-8 | 5 | Black shale |
| SGA-7 | 8 | Limestone with gypsum layer of 2.5 cm |
| SGA-6 | 20 | Intercalated shale and limestone |
| SGA-5 | 60 | Black porous shale with multiple laminae |
| SGA-4 | 20 | Highly fossiliferous white shale |
| SGA-3 | 15 | Gray shale |
| SGA-2 | 50 | Intercalated limestone with occasional fossil occurrence; compact and moderately hard |
| SGA-1 | 20 | Light coloured fossiliferous limestone; less compact |