Depositional processes of the Kaili Formation at Balang Village, Guizhou, China

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The Kaili Formation is a succession of mudstones and fine- to medium-grained carbonates that spans the proposed Cambrian Series 2 – Series 3 boundary. A section near Balang Village has been proposed as a candidate Global Stratotype Section and Point (GSSP). At this locality, the Kaili Formation contains well-preserved fossils throughout its ~200 m thickness, including an abundant and diverse Burgess Shale-type biota of early middle Cambrian (Series 3) age. A composite section of the complete Kaili Formation was studied in detail to address its suitability as a candidate GSSP and to determine the depositional setting of the Burgess Shale-type biota. The section was measured at the cm-scale and sampled at 1 m intervals throughout the complete thickness of the unit, except where covered. Microfacies analysis of 138 samples was conducted in the laboratory, using SEM microscopy, polished slabs, X-ray diffraction, thin sections, and acetate peels. Analyses confirm that depositional processes within the Kaili Formation were consistent throughout the formation, and that event-driven deposition was maintained across its complete thickness; no evidence for condensation is present. The signal of global transgression in the boundary interval is manifest as a slight thinning of millimeter-scale event-deposited lamina from 50–55 m above the base of the formation, around the proposed GSSP boundary at 52.8 m. The entire Kaili Formation was deposited in a distal ramp setting below storm wave base. No silt-sized or coarser clastic particles are present, and no evidence of cross-bedding, scour, or graded bedding occurs in any interval of the formation. The majority of its thickness, including the entirety of the boundary interval, is comprised of mm-laminated calcareous claystones that exhibit randomly oriented clay microfabrics characteristic of deposition from turbid suspension by sediment – gravity flows.

MureroPodia steps in the early evolution of the Bilateria

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A new early Cambrian lobopodian animal (xenusian) MureroPodia Gámez Vintaned et al., 2011 from Spain (Murero Lagerstätte, Cadenas Ibéricas) provides further evidence to support the existence of the molecular clade Ecdyozoa. MureroPodia possesses a trunk bearing a well-developed dermatomuscular sac of transverse and longitudinal muscles and a proboscis with threads of retractor muscles. These features are typical of cephalopods such as priapulids, loriciferans, larval nematomorphs, and a number of extinct early Palaeozoic groups. Also, MureroPodia has several pairs of telescopic appendages (lobopods) terminating with claws which are common in other early Palaeozoic xenusians as well as in Recent tardigrades and onychophorans. Thus, xenusians definitely connect vermiform and appendage-bearing ecdys-
ozan clades. However, these were the Xenusia from which vermiform ec dysozoa ns were derived by adapta-
tion to a burrowing life style and not vice versa. On the other hand, anom alocard idids, tardigrades, and
onychophorans represent further direct xenusian relations-
ships by adaptations to nektonic, miobi enthic, and terrestrial life styles, respectively. Representa-
tives of each of these groups still preserve some basic xenusian features during their embryogenesis. Such
features are a terminal mouth opening and a terminal
anus, a nervous system consisting of a circumpharyngeal brain ring and a ventral cord, and moulded three-
layered cuticle. The Vetulicol a, probably, repre-
sent another group of xenusian descendants. vet ulicol-
ans bear a terminal mouth, a straight alimentary canal
with a terminal anus, a developed dermatomuscular
sac of transverse and longitudinal muscles, and mid-
gut diverticulae. The last feature is commonly inter-
preted as gill pouches providing an incorrect basis for
assigning the Vetulicola to the Deuterostomia and e-
ev to the Chordata. If euarthropods, pentastomids,
and pycnogonids are direct descendants of the Xenus-
ia, or have been evolved from other xenusian clades,
it is still a debatable problem.

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The Paradoxides theorem: staggered FAD of species proves
high resolution of moroccan rock successions

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The traditional Lower – Middle Cambrian boundary in the “Acadobaltic Realm” has been as-
signed at the earliest appearance of the genus Para-
doxides (in broad sense). This concept developed in-
to a theorem, but has shown to be impractical and misleading because even in more – or – less con-
tinuous rock successions over the Lower – Middle Cambrian boundary species of Paradoxides (s. l.) appear at different stratigraphical levels. Neverthe-
less, the hypothesis of the FAD of Acadoparadoxides
mureroensis as an appropriate level for global correla-
tion has been discussed.

Recent investigations in the renowned Tarhtoucht area of the eastern Anti – Atlas, southern Morocco,
has proved a staggered first appearance of at least four species of Acadoparadoxides in the lower Morocconus
notabilis zones. The studied sections show a distinct pattern, in which A. mureroensis is a subsequent arri-
val in the fossil record of the Tarhtoucht region and other areas of southern Morocco. For example, A.
nobilis, and forms close to A. nobilis, have been dis-
covered in the High Atlas and the western Anti – At-
las ranges distinctly below, and its first occurrences can be found even as low as in the upper Hupeolens
Zone. Nevertheless, the earliest species of Acadop para-
doxides in the rock successions have a distinct over-
lap. This proves a fairly reliable fossil record as well as a high resolution of the faunal development. The
Moroccan ‘Giant Paradoxides’ Acadoparadoxides stri-
areus, erroneously synonymized with the Avalonian A.
harlani, has a late acme and range in this early, but
not earliest Middle Cambrian succession and falls into
the middle to upper part of the Morocconus notabilis
Zone.

The infra – Gondwana correlation suggested by A. mureroensis has been buttressed by other index fos-