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The Ledererkar Formation: a new Late Jurassic Formation with type-locality in the Steinernes Meer (Northern Calcareous Alps)

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Whereas the Late Jurassic sedimentological evolution of the Plassen Carbonate Platform in the Northern Calcareous Alps is fairly well understood, the contemporaneous evolution farther towards the Neotethys Ocean is not: Proximal basinal slope sediments associated with a platform evolution south of the Lärchberg Carbonate Platform, as well as of the proximal Sillenkopf Basin are rarely preserved. Also the evolution of the eroded platform evolving on top of the obducted ophiolites is poorly constrained. Here we describe for the first time an Upper Kimmeridgian-Tithonian carbonate succession from the Steinernes Meer Mountains that received material from an eroded platform south of today's Northern Calcareous Alps. We define this succession as the Ledererkar Formation, being part of the Plassen Group.

These Late Jurassic sedimentary rocks are known since v. Krafft (1897). Their origin and age – Early, Middle, Late Jurassic – were discussed controversially for more than 100 years. The most characteristic sections lie in the Steinernes Meer Mts. (with type section Ledererkar), and one section in the Hagengebirge Mts. (reference section Rotwandalm). At the Ledererkar type-locality the succession was preserved in footwall position in the framework of uplift/unroofing of the southern Northern Calcareous Alps contemporaneously with the uplift of the Lärchberg Platform.

Field analysis during the last 50 years revealed that deposition of the Ledererkar Fm. (Upper Kimmeridgian-Tithonian) starts transgressively above the deeply eroded Triassic-Jurassic sedimentary sequences of Steinernes Meer and Hagengebirge Mts. The Ledererkar Fm. is tectonically overlain by various lithologies of a higher structural unit: Alpine Haselgebirge/Werfen Fm., Wetterstein Fm., Dachstein Fm. The emplacement of these km-sized units ("Juvavic Klippen") around the Jurassic /Cretaceous boundary is supported by a calpionellid finding below the Mt. Graskopf klippe.

The type section Ledererkar has a maximum thickness of 120-140 m and is composed of mostly bituminous, organo-detrital limestones with small chert knobs, rich in up to gravel sized angular carbonate clasts, particularly in the lower 20 m, but also in higher section parts. The Ledererkar section contains 4 detrital mass flows of 15, 5, 7 and 40-50 m thickness, partly with thickness and grain diminution from E to W, and rarely turbidites. The component spectrum comprises Late Triassic light-grey basinal limestones and dolomites, Dachstein reef limestone, yellowish dolomite, ?Dürrnberg Fm., red (Bositra) limestone, radiolarite, Haselgebirge claystone, quartzite, metamorphic and volcanic quartz, wood. Ophiolite debris like in the Sillenkopf Fm. is not detected yet. The lowest 15m mass flow carries large slide-blocks of Adnet/Klaus Fm. Most microfossils occur through the whole section: Saccocoma, spicules, radiolarians, aptychi, shallow-water fossils of Plassen Group as echinoderms, benthic foraminifers, calcareous algae, serpulids, sponges, molluscs, corals, reef builders including incertae sedis, also in re-sedimented platform clasts.

The newly defined Ledererkar Fm fills a gap in knowledge regarding both the evolution of the today eroded southern Northern Calcareous Alps, and the provenance and emplacement of the Alpine Haselgebirge mélange.

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