

used as a guide to suitable areas for studies using K-Ar, fission-track, paleomagnetic, and other methods in which secondary heating, if high enough, may introduce serious errors in the results.

## Conodont Biostratigraphy in Carboniferous Limestones of Southern France.

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Conodont biostratigraphy in southern France provides a basis for correlation of Carboniferous rocks from three regions: the central and western Pyrenees, the Mouthoumet massif and the southern slope of Montagne Noire.

In the Pyrenees, a detailed biostratigraphic zonation has been established which includes, from oldest to youngest, the following lithologies: limestone, including nodular limestone (zones Tn1a–Tn2a); chert with phosphatic nodules (zones Tn2–V1); gray micritic limestone (zones Tn3–V3b); variegated limestones with nodular structures (zones V3c–E2); and micritic limestones that are laminated near the top and are locally associated with tongues of breccia (zones H1–R). These units are of variable thickness. The rocks are everywhere overlain by a thick section („Culm“) of pelitic sandstone of Namuro-Westphalian age.

The following conodont zones (oldest to youngest) are erected for the Carboniferous rocks in the Pyrenees: *Siphonodella sulcata* – *Protognathodus kockeli*; *Siphonodella* – *Pseudopolygnathus triangulus triangulus*, *Polygnathus communis carina*, *Gnathodus semiglaber*, *Dolymae bouckaerti*, *Scaliognathus anchoralis*, *G. homopunctatus*, *G. commutatus* – *G. bilineatus*, *G. bilineatus* – *G. nodosus*, *G. bilineatus* – *G. bil. bollandensis*, *Idiognathoides noduliferus*, *I. sinuatus*, *I. sulcatus* cf. *parvus*.

The western part of the Mouthoumet massif (relative autochthon) includes the following stratigraphic section (from oldest to youngest): micritic limestones, commonly nodular (zone Tn1a); black chert with phosphatic nodules (zones Tn2a–Tn3); and bluish-gray to pale gray well bedded limestone, becoming more argillaceous towards the top and commonly including cinerites and green chert (zones Tn3c–V3c); a detrital series locally containing *Goniates* („Mondette“ fauna) typical of the Viséan–Namurian transition. The following conodont zones are recognized: *Sc. anchoralis*, *G. homopunctatus*, *G. commutatus* – *G. bilineatus*, *G. bilineatus* – *G. nodosus*, *G. bilineatus* – *G. bil. bollandensis*.

Five lithologic units are exposed in overturned limbs of nappes on the southern slope of Montagne Noire and represent the entire Dinantian. From oldest to youngest these units are as follows: nodular limestones („supragriottes“) (zones Tn1a–Tn1b); chert with phosphatic nodules (zones Tn2b–Tn3c); intermediate nodular limestones (zones Tn3c–V1a); light-colored cherts, turbidites and calcareous breccias (zones V1b–V3b); and a flysch series, with calcareous olistostromes, younger than zone V3b. The Dinantian in the olistostromes differs from the Dinantian rocks in the nappes by the presence of oolitic and bioclastic limestones, occasionally with graded beds; limestones with flint or chert layers; beds of nodular marly limestone containing Cephalopods and trails; limestone reefs; and local unconformities (upper Tournaisian limestones overlying with hard ground various units of Famennian age).

The conodont zones characteristic in the Pyrenees are poorly represented in the Montagne Noire region. The zones present are: *Sc. anchoralis* and *G. commutatus*. The *Pr. kockeli*, *Siphonodella* – *Ps. triangulus triangulus*, and *G. commutatus* – *G. bilineatus* Zones are rarely present, and the others present in the Pyrenees have not been recognized.

From these observations, it appears that the Tournaisian zones are not everywhere systematically present. The oldest beds contain the *Sc. anchoralis*-Zone. These beds occasionally are transgressive upon various Devonian rock units. In regard to the Viséan, the *G. homopunctatus*-Zone is practically present in all of the areas studied. The *G. bilineatus* – *G. nodosus* and *G. bilineatus* – *G. bil. bollandensis*-Zones are missing in the Montagne Noire region, present in the Mouthoumet massif and well developed and overlain by the *Idiognathoides*-Zones in the Pyrenees.

The deposition of flysch lithologies seems to have begun earlier in Montagne Noire (zones V3b–V3c) than in the Mouthoumet massif (zones 3Vc–E1), and they appear still later (H or R zone) in the western Pyrenees. Farther to the west, e. g., Asturias, northwestern Spain, flysch deposits first appear from Namurian A (Serpukhovian, E2) to Namurian B (Bashkirian, R).

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