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Studies on the Devonian Strata  
of Chaleur Bay, Québec

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McGERRIGLE (1950) and CUMMING (1959) have conducted an appreciable amount of stratigraphic and paleontological work on the Devonian strata of Eastern Gaspé. To the south, however, little has been done since the days of KINDLE (1930) and ALCOCK (1935) on the magnificent Devonian exposures on the north side of Chaleur Bay and the Restigouche River. The fish fauna of the famous Escuminac Formation in this area has been a continued study by several generations of vertebrate paleontologists (WHITEAVES, 1880, ØRVIG, 1957), but scant attention has been paid to the sedimentology of the Gaspé Devonian. KINDLE (1930), BÉLAND (1958) and CARBONNEAU (1959) all comment on diverse environments of deposition, especially in the more "continental" types of beds, and in so doing reveal the possibilities for sedimentology research in this area.

The present writers began research on some aspects of the sedimentation of the Chaleur Bay sequence in October, 1964. The Devonian stratigraphy of this sequence has been completely re-evaluated and the sedimentology of three formations analysed in detail; particular emphasis has been laid on interpretation of the depositional environment of the Escuminac Formation.

Stratigraphy.

The following table compares the stratigraphy of ALCOCK (1935) with the results of the present study:

## ALCOCK (1935)

## Present Study

Lower Pennsylvanian	Bonaventure Fm. -----unconf-----	Lower Pennsylvanian	Bonaventure Fm. -----unconf-----
Upper Devonian	Escuminac Fm. Fleurant Fm. Pirate Cove Fm. -----unconf?-----	Upper Devonian	Escuminac Fm. } Miguasha <sup>1</sup> Fleurant Fm. } Group -----unconf-----
Middle Devonian	Gaspé Sandstone Gp. (including lowest part of the re-defined Pirate Cove Fm.) -----unconf-----	Lower or Middle Devonian	Pirate Cove Fm. La Garde Fm. <sup>2</sup> -----unconf-----
Lower Devonian	volcanic and sedimentary rocks	Lower Devonian	volcanic and sedimentary rocks

<sup>1</sup>. A new stratigraphic term suggested to draw attention to the marked association of the Fleurant and Escuminac Formations.

<sup>2</sup> This name is suggested to distinguish the rocks of Chaleur Bay from the typical Gaspé Sandstone of Eastern Gaspé. The name was originally suggested by BÉLAND (pers. comm.)

A marked difference in the above tables is the distinction between the Pirate Cove Formation and the Miguasha Group. Formerly the Pirate Cove beds were included with the known Upper Devonian formations on the basis of their supposed conformity with the latter. However, detailed field work suggests that:

1. The Fleurant Formation of the Miguasha Group overlies the Pirate Cove Formation with angular unconformity.
2. The Pirate Cove Formation is most probably conformable with the La Garde beds, the junction being one of transition.
3. The thickness of the Pirate Cove Formation has been expanded by the inclusion of the upper part of Alcock's Gaspé Sandstone Group.

Formal definition of the Miguasha Group and La Garde Formation, and re-definition of the Pirate Cove Formation, will be made elsewhere.

### Sedimentology

A study of the depositional features of these Devonian rocks resulted in the following environmental picture. Briefly, the Pirate Cove, Fleurant and Escuminac Formations represent an intermontane basin complex of red, angular limestone-clast 'fanglomerates' and sandstones, grey roundstone conglomerates and green-grey carbonate-rich sandstones and shales.

The Pirate Cove Formation is interpreted as an alluvial fan-floodplain deposit, the derivation of the clastic material being dominantly from the WNW - NNW. Uplift and erosion took place at the end of Pirate Cove times and large clasts of Pirate Cove material, up to 14 inches in length, are found in the unconformably overlying Fleurant Formation. Over 90% of the Fleurant lithology is coarse rudite, and large boulders (up to 4 feet in length) of Lower Devonian volcanic material occur at the base of this formation. Despite the large size of the Fleurant clasts, the boulders are well rounded and thus present a marked contrast to the poorly sorted, angular rudites of the Pirate Cove Formation below. Furthermore, jasper boulders in the Fleurant exhibit beautiful crescentic percussion marks (identical to KLEIN'S (1963) Quaco Formation boulder markings), which are attributable to clast impact during fluvial transportation.

The youngest Devonian formation in this area, and probably in the whole of the Gaspé peninsula, is the well documented Escuminac Formation. Although many publications have included reference to the Escuminac beds in some context, almost no mention has been made of the magnificent sedimentary structures preserved on many of the sandstone soles or within the individual sandstone beds. Apart from the remarkable foresight shown in KINDLE'S (1930) broad conclusions concerning the origin of the Pirate Cove and the Upper Devonian sediments, only WESTOLL (1959) has remarked on the sedimentary features of the Escuminac beds. The aim of the present study was to determine the precise environment of deposition of this carbonate-rich sequence of sandstones and shales, and the effect the sand-bearing currents had on the habitat of the indigenous fauna.

All the physical and biological attributes of this formation were recorded in detail so far as possible. The arrangement, geometry, type and relative thicknesses of the lithotypes together with the interpretation of the primary sedimentary structures - flute casts, groove casts, other tool marks, flat and cross laminations, parting lineation and ripple marks - all indicate the realm in which the Escuminac material was deposited. Furthermore, the state of preservation, the orientation (if any) and the location of the fish remains in the formation provide additional criteria in the recognition of the exact environment.

Taking all this data into consideration, the lacustrine process of sedimentation was found to be the one most adequate to explain the various combinations of features found in the Escuminac Formation. Insight into the bathymetry and hydraulics of deposition was gained by using this data.

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Silurian-Devonian Stratigraphy in the  
Charlo Map Area, New Brunswick\*

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Several years' field-mapping in the Charlo area just east of Dalhousie, N. B., have been done for the New Brunswick Mines Branch, and the work is now completed.

No geological work had been done here since ALCOCK'S study of the Chaleur Bay area some 30 years ago (1935). The geology is complicated, not only because several intervals of deformation have taken place, but because the two principal groups of rocks, with sedimentary as well as volcanic units, bear a strong resemblance to each other both lithologically and faunally.

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