

GANOID FISHES IN BUTE

By G. D. MATHESON, B.Sc.

Two localities containing Ganoid Fish remains have been discovered on the island of Bute — one in South Bute to the South of Kilchattan Bay and the other in Central Bute at Montford. Both are connected with Early Carboniferous sediments. The discoveries are extremely important and only one other locality in Bute is known to contain Pre-Glacial fossils—a thin plant bearing horizon associated with a coal seam immediately below the Carboniferous Lavas at Ascog in Central Bute.

Locality 1 Hawk's Nib, South Bute.

In South Bute a thin succession of dark grey mudstone, containing regularly spaced cementstone bands and nodules of secondary origin and passing upwards into a micaceous yellow sandstone, is exposed on the shore to the south of Hawk's Nib (Grid Ref.: O.S. 114535). The total thickness of the succession is slightly over 100'. The lithology is typical of the Cementstone Group of Lower Carboniferous age in the Midland Valley of Scotland and their presence in South Bute is in keeping with the known occurrences in Arran and Ayrshire.

The mudstone dips to the south-west at 28° and rests with conformity of dip on a poorly developed cornstone horizon which is part of a thicker cornstone sequence typical of the topmost beds of the Upper Old Red Sandstone. There is no gradation or interdigitation between shale and cornstone — the change in lithology is abrupt. The basal lava flow of the South Bute Carboniferous sequence defines the upper limit of the succession and only a very minor unconformity — of a few degrees in strike — separates lava from sediment. The Cementstone succession has been preserved

in a downfaulted portion of the pre-lava land surface protecting the region from the pre-lava but post-faulting denudation which has stripped the thin cover of Lower Carboniferous sediments from the remainder of the Southern part of the island so that elsewhere in South Bute, Carboniferous Lava rests directly on the Upper Old Red Sandstone sediments. The throw of this Carboniferous pre-lava fault is in the order of 40', down to the south and trending WSW - ENE cutting the foreshore at Hawk's Nib point.

Numerous horizons in this Cementstone succession contain the fragmented remains of Ganoid Fishes. These fishes, living over 200 million years ago during the earliest part of the Carboniferous period possessed a protective covering of thick bony plates over the head regions and an armour of smaller bony scales, normally rhomboidal in shape, slightly overlapping and possessing peg and socket articulation, over the remainder of the body. The fossiliferous horizons in the beds of Cementstone age in South Bute occur towards the top of the succession and contain an abundance of small scales averaging $\frac{1}{4}$ " in size, and bony head plates, mostly fragmented but sometimes whole, ranging in size from extremely small to over $2\frac{1}{2}$ " in diameter. At the time of writing the best specimen procured is that of the left ramus of a lower jaw showing two rows of teeth. A specimen of what could be a palatal one containing teeth has also been discovered.

The fish remains are present at distinct horizons, all of which show evidence of deposition under conditions of strong current action, in which the sediment loses its fine-grained character. Most of the better specimens have been obtained from one particular and localised band, towards the centre of the Cementstone succession. At this horizon the normal fine-grained mudstone is partly replaced by the development of a "pellet-conglomerate" containing ovoids of mudstone and larger ones of a clay-material containing small quartz grains, in a matrix of fine mudstone. The mudstone pellets vary in size but average $\frac{1}{4}$ ". Those of the clay-with-quartz are irregular in shape and may reach 3" in length. All show extreme flattening parallel to the

planes of deposition, and it is likely that this flattening is the result of compaction after deposition. The pellets and the fish fragments are foreign to the environment of deposition of fine mudstone and their presence is the direct result of secondary deposition. Strong current action (slumping with turbidity?) has caused these to be transported and redeposited in an environment of fine mudstone deposition. The type of environment visualised is that existing in present-day estuaries, here off-shore deltaic accumulation of fairly fine muds and fine sandstone result in the formation of a steep "offset slope." Instability with increasing rate of sedimentation results in slumping of material down this offset slope, with the formation of turbidity currents, and transference of material into the deeper (but not necessarily by much) environment of fine mud deposition. The fish in question did not lie in this environment of fine deposition — their remains have been carried into it by current action, even in the strongly current-bedded yellow sandstone towards the top of the succession, fragmented fish remains can be found.

The brittle and fragmented nature of the bones and scales at this locality make collection and subsequent identification extremely difficult. A sufficient number of the many specimens collected were, however, diagnostic of at least the Family to which these fish belong. These fossils, combined with a consideration of the lithological characters of the strata in which they occur, indicate a definite Carboniferous age for the succession above the cornstone. This is the first true indication of the existence of Carboniferous sediments in South Bute and demonstrates the magnitude of the unconformity below the Carboniferous Lavas. Generic and Specific identification of the specimens obtained so far is impossible — a direct result of the limited knowledge of Lower Carboniferous fish as a whole, and the fragmented nature of the remains found at this locality.

Locality 2 Montford, Central Bute.

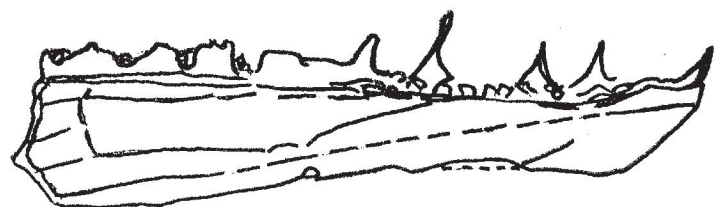
At Montford, exposed in the shore cliff below Millbank (Grid. Ref.: O.S. 106640) are reddish-brown and purple

shales containing one conspicuous harder band of brownish mudstone. The region is much broken up by minor faulting and individual beds are difficult to trace for any distance. The fossiliferous horizon is the harder mudstone band and remains fairly constant in thickness between 3" and 4". Although the author has since studied the region in some detail the initial discovery of the fossil content of the rocks was made by another local geologist — E. McGuinness — whilst engaged in the basic mapping of the region.

Numerous poorly-preserved plant fragments, worm burrows and ganoid plates and scales are present with this mudstone band. The ganoid fish scales are extremely small (normally $\frac{1}{8}$ "), and fragmented head plates are rarer than in the South Bute locality, although plates over 2" in length have been found. The ganoid scales are present in great abundance and their shape and ornamentation resembles that of known Lower Carboniferous Palaeoniscids. The horizon containing the fossils can be traced intermittently for over 100yds. along the foreshore. Although the fossil content of these rocks suggests that they are of Carboniferous age the reddish-brown colouration is much more characteristic of the preceding period.

Both localities are important discoveries and are likely to lead to an advancement in the fossil record of the poorly known period covering the late Upper Old Red Sandstone and the early Lower Carboniferous in Scotland. The discovery of sediments belonging to the Cementstone group in South Bute is in itself an important step forward towards a more complete understanding of Lower Carboniferous Palaeogeography in Scotland.

This paper is taken from the B.Sc. 1st Class Honours Thesis on the Geology of the south end of Bute. The Thesis can be consulted in the Museum Library.



X 4½

Left Ramus of lower jaw, view from interior. Double row of teeth. Inner row of sharp pointed laniaries, evenly spaced and the anterior one showing slight anterior inclination, curving dorsally into a blunt tip. Several are preserved in the specimen and the bases of the others can be seen in the posterior part of the jaw. Outer row of small peg-like teeth in which the crown is somewhat expanded towards a flattened top. Only to be seen to the posterior of the specimen. Jaw fairly deep, tapering very quickly at the extreme anterior end. Bone smooth and glossy, slightly concave to viewer.

In dentition the specimen is typically Palaeoniscid — the double row of teeth being characteristic. The quickly-tapering anterior end of the lower jaw suggests similarities to the general *Fouldenia* (White), *Carboveles* (White) and *Ekonichtys* (Giebel). The type specimens of the varying species of the above mentioned are not sufficiently well preserved for definite identification of this specimen.

Family PALAEONISCIDAE



X 9

Scale from left flank showing area of overlap and articulating peg. Incomplete at postero-ventral margin. Free surface brilliantly polished. Rhomboid with distinctive ornament of coarse rugae tending to converge at the postero-ventral border. A normal type of Palaeoniscid squamation.

SCOULAG KIRK

By GEORGE HAY, A.R.I.B.A., F.S.A., Scot.

The parish of Kingarth is fortunate in possessing a fine Romanesque church albeit in ruins, standing on an early religious site of great beauty. Less well-known than the kirk of St. Blane is the little building at Scoulag, which was once the centre of a hamlet and which served the parish in later times. Standing now within the policies of Mount Stuart, it is the property of the Bute family, who as patrons built it in the mid-18th century. When in the early 19th century it ceased to be the parish kirk, it became what Blain in his "History" referred to as "a very genteel and convenient chapel of the family" and had thus the good fortune to be preserved complete in most of its essentials. As an excellent example of a Scottish post-Reformation kirk this little building is worthy of study.

Like many others of the period, it is a T-plan structure whose north aisle, or wing, accommodates the laird's loft, reached by a fine ashlar forestair against the north wall. Its harled walls, with rusticated quoins and other dressings of red sandstone, are capped by a moulded cornice, above which rises a steep-pitched slated roof. The east and west ends have round-arched doorways flanked by blind rectangular ones and, in an unusual straining after symmetry, both pedimented gables are surmounted by a square belfry with ogival head. The south wall, against which the pulpit stands inside in the usual manner, has a balanced arrangement of two rectangular doorways and four round-headed windows with rusticated dressings. The latter are each divided Gothic-wise by a central mullion into two lancet lights.

The vernacular classical character of the exterior is maintained inside the building. There is a coom-ceiling of plaster; the laird's loft has panelled walls and breast and an entablature overhead; and the original pulpit of oak with