The tail and hinder part of the trunk present the right lateral aspect to view, but the remainder of the body lies squarely on the ventral surface and is flattened out symmetrically on both sides by pressure. The fins are superbly preserved, and with their bundles of finely articulated rays and fringe of biserial fulcra make a striking appearance. The total length of the fish is 1·7 m., of which the head forms about 0·5 m. In point of size, relative length of head, fin-structure, and squamation, there is a very close resemblance to the recent Alligator gar, or *L. viridis*, Günther; the dentition is much the same, and the number of longitudinal and transverse scale-series is the same in both. A detailed description of the new specimen will form the subject of a separate paper; it will be sufficient for the present to point out that the modern gar, and more particularly the Alligator gar, has existed from at least Eocene times essentially unchanged.

EXPLANATION OF PLATE IV.

Gallinuloides Wyomingensis, gen. et sp. nov. Middle Eocene: Fossil, Wyoming. *c*, coracoid; *cl*, furculum; *f*, right femur; *h*, *h'*, humeri of left and right wings respectively; *i*, ilium; *m*, manus; *p*, pubis; *r*, radius; *rb*, detached rib; *s*, scapula; *st*, sternum; *t*, tibia; *tm*, tarso-metatarsus; *u*, ulna; I-IV, toes.

III.—SOME SNOWDON TARNs.

By J. R. DAKYNS, Esq.

I HAVE from my boyhood been intimately acquainted with Snowdon and its neighbourhood, and for some years past I have been investigating the geology of the district in a systematic manner. In doing this I have paid particular attention to the lake basins, and shall in the following pages give an account of some of my investigations as far as they have gone. I say as far as they have gone, because I hope in the future to make by means of a level more accurate measurements than can be made with a pocket aneroid; and I also hope that next Summer the lakes and tarns will be sounded either by myself or by someone else; for at present we know nothing about the depth of Llyn dur Arddu, next to nothing above that of Glaslyn, and very little about Llydaw, though that little is of great importance.

I will now proceed with my account. Glaslyn at its outlet is bounded by rock on the north side and by drift on the south, but the shape of the ground shows that the drift is merely a mound of no great thickness, banked against the Gribbin, as the rocky spur is called which separates Glaslyn from Llydaw. At a distance of about twenty yards from the lake solid rock is seen in the bed of the outflowing stream at less than six feet below the level of the lake. This to my mind proves without any reasonable doubt that the lake lies in a rock basin; for, as I said above, the drift is apparently of but little thickness, and the lake is certainly more than six feet deep: I have myself dived into it to a greater depth than that. I will not, however, insist upon this; for at the old mill, seventy yards from the lake, solid rock extends right across the

stream from the Gribbin on one side to the cliffy ground, on the other, along which the road from the mines runs. From this point in the stream one can ascend to the summit of Snowdon, either by the Gribbin on the south or by way of Crib y Ddysgl on the north, without treading on anything but solid rock. This point is, as measured by an aneroid, 40 feet below the level of the lake. Consequently, unless Glaslyn is less than 40 feet deep, it must lie in a rock basin, even if we neglect the fact that rock is seen in the stream at only a few feet below the level of the lake. We do not know the depth of Glaslyn, but it is probably more than 40 feet deep; for on the north side, near the mine, rock comes down to the water at a slope of 30° , and on the opposite side the average slope of the rocks coming down to the lake is even more than 30° .

I conclude, then, that Glaslyn occupies a rock basin. In their paper on the Lakes of Snowdon, Messrs. Marr and Adie write in reference to the outflow of Glaslyn, with all the emphasis of italics, "*the bottom of the drift-filled depression is at a lower level than the present stream*, which runs at the side of the valley, being separated from the lowest part by a low shelf of rock." What they call the present stream is an artificial watercourse made by the old miners to carry the surplus water of the lake clear of their works. Comment is needless.

Llyn Llydaw is dammed up by glacial deposits; but at 250 yards from the outlet solid rock is seen in the issuing stream and on both sides of it. This point in the stream is by my aneroid from 25 to 30 feet below the level of the lake. Mr. Watts, however, considers the first live rock seen by him in the stream to be 40 or 50 feet below the level of the lake. At 250 yards from the present outlet, in a N.N.W. direction, there is a depression by which the lake may possibly have once discharged itself; and at about 225 yards from the lake solid rock is seen in the bottom of this depression and on both sides thereof. According to the aneroid this point is 40 feet below the level of the lake. The space between the present outflowing stream and the above-mentioned channel is occupied by drift which thins away eastward, so that immediately south of the little pool, shown on the Ordnance six-inch map, rock forms the surface of the ground. The place where the rock is seen in the said depression, as stated above, is just where it is joined by another depression, which runs down from the little pool, and it is along this line that Mr. Marr imagines the lake to have formerly drained.

Consequently, in all possible outlets, real or imaginary, to Llydaw, solid rock is first met with in descending from the lake, at a level no lower than 40 or 50 feet below its surface. Llydaw must then lie in a rock basin unless it is less than 50 feet deep; but we have reason for believing that it is much deeper than 50 feet. Many years ago a man's clothes and boots were found lying beside the lake. It was supposed that the owner had been drowned. A professional diver was fetched up from Caernarvon, and search was made for the missing body. The late Henry Owen, the well-known

landlord of Pen y Gwryd, was present at the search; and he told a friend of mine that in one place no bottom was reached at the depth of 200 feet. Unless, then, this estimate was grossly erroneous Llydaw must lie in a rock basin.

There is not much to be said about Llyn dur Arddu. It lies at the head of Cwm Brwinog under the precipice called Clogwyn dur Arddu, which forms the south side of the Cwm, and rock is seen at the outlet on the south side of the stream; but no rock is to be seen on the north side of the lake, nor, as far as I know, for a long distance down-stream; in fact, on that side nothing is to be seen but a steep bank strewn with large blocks of stone, so that we cannot tell whether the tarn lies in a rock basin or not. Although nothing but the rock-strewn bank is to be seen on the north side of the Cwm, yet the unsophisticated intellect conceives that the Cwm is bounded on that side, too, by solid rock, hidden, however, by superficial detritus. There is absolutely no evidence to support the assertion of Messrs. Marr and Adie that the lake once drained more northward down a valley now buried under moraine. Not only is there no evidence in favour of such a view, but the chances are all the other way, for it presupposes a far greater thickness of drift than is known to occur in any part of the district. There are many places in the Snowdon region where the thickness of the glacial deposits can be measured. As far as I know, these deposits are thickest under Yr Aran, on the left bank of the Colwyn, about a mile above Pont Caer-gors, and here the thickness is less than a hundred feet. In most cases it is much less than this. Thus it is most improbable that there should be in Cwm Brwinog so great a thickness of drift, and that for the distance of a mile or more, as must be the case if there is such a buried valley as Messrs. Marr and Adie assume.

The tarns in Cwm Glas are so shallow that they are of little importance, but the lower one, Llyn Glas, most certainly lies in a rock basin, for, without going below the level of the tarn, one can walk all round it without ever treading on anything but solid rock.

I shall not at present say more about Cwm Glas, nor about Cwm Brwinog, as I hope on a future occasion to deal fully with the geology of these corries. Nor shall I now treat of the Snowdonian lakes as distinct from the tarns; but as Messrs. Marr and Adie, in the part of their paper on the Snowdon lakes dealing with Llyn Cwellyn, have indulged in some speculations and statements about a part of the country with which I am intimately acquainted, I must point out some mistakes into which they have fallen.

On p. 55 of their paper they say "a drift-filled depression is traceable up a tributary joining it" (the main stream) "a few yards south-east of Cwellyn State Quarry." This is a mere assertion: no proof is offered of the existence of drift in this depression; it is simply assumed, and in fact no proof can be offered, for along the course of the little valley there are no sections in superficial material save one near Ffridd quarry, where a pit has been dug for walling-stones in some loose stuff which may be morainic. Throughout the

rest of its course there is no evidence of the existence of glacial drift; but on the contrary some evidence that there is no drift in the depression, for solid rock is seen close to the stream at 100 yards north of the narrow-gauge railway; and still further north the valley is cumbered with large angular blocks consisting entirely of diabase, which have fallen from the cliffs above. There is no drift, for were there any we should find stones of many different sorts, and many of them would be rounded. So Mr. Marr's drift-filled gorge 350 feet deep is a mere figment of the imagination. I must also remark that judging from the shape of the ground Llyn Cwellyn is probably a great deal more than 50 feet deep.

As to the peaty watershed near Pitts Head, it matters nothing whether it is "composed of an alluvial deposit" or not, for the solid rock comes to the day in so many places that the superficial covering is evidently merely a thin skin.

On the next page the authors say "the bed of the Colwyn runs over drift until within a short distance of Beddgelert." I am sorry to be obliged to contradict the writers, but the above statement is incorrect. Neither the Colwyn nor its bed runs over drift immediately south of Pitts Head watershed, for solid rock is seen in the bed of the river at Pont Caer-gors and at several other places for more than 550 yards down-stream, at which distance the river actually runs in a rocky gorge. The eastern side of the Colwyn valley is formed of solid rock, not only throughout the whole of this distance, but for much further south. A low bank of drift forms the western margin of the river immediately south of Pont Caer-gors. This drift obviously lies as a tablecloth on a gently sloping surface of rock which comes to the day 300 yards west of the bridge. No drift-buried gorge is possible here. The upshot is that Messrs. Marr and Adie, in their hurry to escape from a rock basin, have invented an impossible gorge to carry the water of Llyn Cwellyn across a mountain range whose lowest point is 650 feet above the sea, that is, 186 feet above the present level of the lake. This is a brilliant effort of the imagination, though hardly of the scientific sort, but it does not come near that of the old Welsh, who imagined an underground connection between Llyn Cwellyn and the Llanberis lakes to account for the existence of char in both.

IV.—NOTE ON A CRUSTACEAN *MESODROMILITES BIRLEYI*, GEN. ET SP. NOV., FROM THE GAULT OF FOLKESTONE, KENT.

By HENRY WOODWARD, LL.D., F.R.S., F.G.S., etc.

ONE of the results incidental to the meeting of the British Association for the Advancement of Science at Dover in September last was a visit paid to Folkestone by the members of Section C (Geology). Among the ladies present was Miss Caroline Birley, well known both as a traveller and for the deep interest which she has always taken in palæontological research; she is also the owner of an excellent private museum of minerals and fossils,