

A careful study of the mode of occurrence of elementary crystals in them shows that the growth of a skeleton augite is almost invariably accompanied by the elimination of iron oxide at intervals along the stem and arms of the skeleton crystal. *Here*, the reverse occurs. The brown patch (which may be regarded as an enlarged basic globulite) contains the ingredients both of the pyroxene and iron oxides, the latter apparently in excess of the former. The pyroxenic constituent separates out in globulitic forms, segregates at the edges of the patches, and is gradually eliminated as the globulitic processes break off and become definite elementary pyroxenes. It is not suggested that after this the brown patch merely assumes hexagonal outlines—although its somewhat marked angularity seems to indicate an inclination to do so. The process is, no doubt, much less simple, and must involve a differentiation between the hæmatite and the black oxide of iron; but it is certain that these minerals do assume a more or less definite crystalline form after concentrating as much as possible, and so eliminating the pyroxenic material.

EXPLANATION OF PLATE XI.

ROCK-SECTIONS, PRE-TERTIARY DYKE, USWAY BURN.

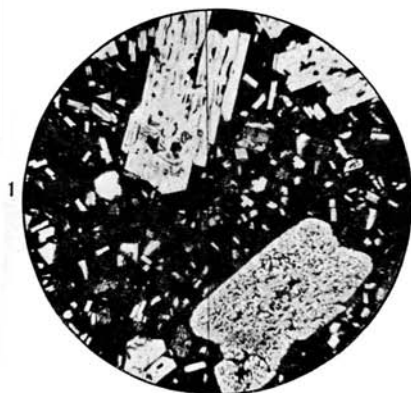
- FIG. 1. This shows the general structure of the rock. There are two types of porphyritic felspars: the upper one belongs to the first set, and has few inclusions and clear sharp angles and edges. The lower one has rounded angles and is riddled with inclusions: it belongs to the second set. $\times 22.6$ diameters.
- „ 2. Shows the same field between crossed nicols.
- „ 3. This shows the mode of occurrence of the elementary felspars. The 'hour-glass' structure is well seen in the small longitudinal section which occurs near the centre of the field. $\times 260$ diameters (approx.).
- „ 4. This emphasizes the dark borders of the brown patches, and shows the globulitic nature of the processes. In the centre of the field there is a small hexagon of the micaceous iron oxide, in which different thicknesses (due to incomplete cleavage-plates) have produced different intensities of colour. $\times 260$ diameters (approx.).
- „ 5. An incomplete pyroxene is seen here. Although it occurs in a dark patch, it is surrounded by a zone of light-coloured material, which also fills the gap extending across the centre of the crystal. There are several small detached pieces of pyroxene near the lower left-hand corner of the crystal. $\times 208.3$ diameters (approx.).
- „ 6. Shows the same with nicols crossed. This brings out clearly the isotropic nature of the colourless material which forms the zone and the central inclusion.

IV.—NOTE ON A MOUNTED SKELETON OF A SMALL PLIOSAUR, *PELONEUSTES PHILARCHUS*, SEELEY, SP.By C. W. ANDREWS, D.Sc., F.R.S., British Museum (Natural History).¹

(PLATE XII.)

THE skeleton figured on Plate XII is that of a small Pliosaur, *Peloneustes philarchus*, Seeley, sp. This specimen was obtained from the Oxford Clay in the neighbourhood of Peterborough by Mr. A. N. Leeds, F.G.S., to whom the British Museum is indebted for a great series of more or less perfect skeletons of many species of

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× 22·6



× 22·6



× 260



× 260



× 208·3



× 208·3

Rock-sections from pre-Tertiary Dyke, Usway Burn.

Oxford Clay Reptiles, including the beautifully preserved and nearly complete examples of *Cryptocleidus oxoniensis* and the remains of *Cetiosaurus leedsi*, now mounted in the Gallery of Fossil Reptiles. So far as I am aware, this is the first skeleton of a Pliosaur that has been mounted so as to show the true form of the body in those reptiles. All the bones belong to a single individual, but the left-hand paddle and the distal portion of the other paddles being wanting, they have been represented by plaster models made from the paddles of another individual, which are exhibited on the floor of the case. The left ischium has been modelled from that of the opposite side.

Peloneustes philarchus was first noticed by the late Professor H. G. Seeley¹ under the name *Plesiosaurus philarchus*. Subsequently Mr. Lydekker² gave a more complete account of the species and referred it to a new genus, *Peloneustes*. The structure of the skull was described by the present writer in the Ann. Mag. Nat. Hist., 1895, ser. vi, vol. xvi, p. 242.

Peloneustes, though considerably smaller than the other Pliosaurus, exhibits all the characters peculiar to that family, viz. relatively large head, short neck with double-headed cervical ribs, absence of a median symphysis of the scapulæ, greatly elongated ischia, and hind paddles larger than the fore. Mr. Lydekker, however, considers that in some respects it is more primitive than the larger forms, and tends to bridge the gap between them and the true Plesiosaurs.

The skull, which in the present specimen is somewhat crushed and distorted, is relatively large and the snout is considerably elongated, the length of head being about two and a half times its width at the posterior end. There are six teeth in the premaxilla, and twenty-eight to thirty in the maxilla; in the lower jaw there are about thirty-five teeth on each side, of which fifteen to sixteen are in the symphyseal region. The teeth themselves are slender and sharp-pointed; they are circular in section, and the enamel-covered crown bears numerous fine longitudinal ridges, some of which extend to the apex. The neck is short, and is composed of twenty-one or twenty-two vertebrae, including the atlas and axis; the centra are short and slightly biconcave, the neural arches and spines are high. All the cervicals behind the united atlas and axis, with the exception of the last, bear double-headed ribs, but the facets for the upper and lower heads are separated by a slight ridge only; the last cervical seems to have had only one head, and the same is the case with the pectorals and dorsals. Of these there seem to have been two or three of the former and twenty-two or twenty-three of the latter, all bearing comparatively slender ribs. The number of sacral and caudal vertebrae is not definitely known.

The shoulder-girdle is typically Pliosaurian, the coracoids are large thin sheets of bone; the scapulæ are triradiate, but the ventral rami do not meet one another in the mid-ventral line, nor do they meet the coracoid. Some specimens show that a triangular interclavicle was interposed between the ventral ends of the scapulæ. The fore paddle

¹ *Index to Aves, etc., in the Cambridge Museum*, 1869, p. 139.

² *Quart. Journ. Geol. Soc.*, 1889, vol. xlv, p. 48.

is smaller than the hind; the humerus is only slightly expanded at its lower end, and the rest of the paddle is long and slender. The pelvis consists of small rod-like, backwardly sloping ilia, great thin plate-like pubes, and the greatly elongated ischia characteristic of the family. As usual in the group, the ilium is not in contact with the pubes in the acetabulum. The greatly expanded coracoids, pubes, and ischia formed an almost continuous bony floor to the body, and the short interval between the posterior edge of the coracoids and the anterior edge of the pubes was filled by a plastron of ventral ribs; in the mounted specimen this is represented only by three of the median ventral ribs, which are fused with one another on the middle line.

The hind paddles, though larger, are closely similar in form to the fore paddles. The total length of the specimen as mounted is 11 ft. 6 in. The dimensions in centimetres of some parts of this skeleton are—

Skull, length	55.7	centimetres.
Mandible, length	67.0	„
„ length of symphysis	21.4	„
Coracoid, greatest length	47.0	„
Humerus, length	33.0	„
Pubes, length	33.8	„
Ischium, length of median expansion	37.0	„
Femur, length	39.0	„

V.—GLACIER GRANULE-MARKINGS.

By R. M. DEELEY, M.Inst.C.E., F.G.S.

(PLATE XIII.)

I HAVE already described the granular appearance of glacier ice as seen in polarized light¹ and also the striations on the granules as shown by pencil rubbings.² Last summer I succeeded in obtaining exact reproductions, in plaster of Paris, of the ice surface-structure in the upper cave in the Rhone Glacier. These are shown in Figs. 1-3.

The casts were obtained in the following manner. Plasticene, a substance used for modelling, having been cooled to the temperature of the ice, was pressed against the wall of the cave. When all the conditions were favourable the surface of the plasticene took an exact impression of the ice-surface. A cardboard ring, obtained from a pillbox, the top and bottom of which had been removed, was then pressed upon the surface of the plasticene and filled with liquid plaster of Paris. When the plaster had properly set the plasticene and cardboard were removed. Photographs of these casts, as will be seen from the photos reproduced, give very good representations of the ice markings (see Plate XIII).

A careful examination of well-marked granules in which liquid cavities had been produced by a burning-glass showed that the ridges and furrows in each grain were along planes at right angles to the optic axes of the granules. It is clear, therefore, that the direction of the markings is determined by the crystalline structure of the ice.

Fig. 2 is a print of a portion of the surface of a large glacier granule, and Fig. 1 shows portions of several granules. Fig. 3 is

¹ GEOL. MAG., 1895, p. 152.

² Ibid., 1907, p. 529.