

Origin of Flints.

HAVING paid some attention to the study of flints, both in England and Australia, I have read with interest the recent letters to NATURE on this question, and think that possibly some facts from this side of the globe may be worth noting. In the Cainozoic of South Australia and Victoria black flints occur which have the characteristic white coating of the English examples, and, in fact, are indistinguishable from them. They are found both in nodular and tabular form, and occur in lines parallel to the bedding. At Port Macdonell, South Australia, sheets of flint are found 2 in. or 3 in. thick, and, according to Tenison Woods, they are quarried and used for flagstones. These Cainozoic flints appear to be confined to the Miocene (Janjukian) beds, and are closely associated with the polyzoal limestone, a white, chalky deposit consisting of polyzoa and foraminifera.

The evidence of a microscopic examination of these flints goes to prove that the position held by Prof. G. A. J. Cole, that chalk flints represent a more or less complete replacement of the chalky ooze, is the only one tenable from the Australian point of view. The Australian flints are often crowded with the silicified remains of polyzoa, foraminifera, shell-fragments, and occasional sponge-spicules, the last merely included as a component of the ooze and not as selected material. During the formation of the flint the calcareous bodies are frequently dissolved, and only remnants are seen in some cases in the flint sections.

Another point in corroboration of Prof. Cole's contention (based on Liesegang's experiments) is the presence of an impervious bed underlying these Tertiary flint layers. This was pointed out long ago by Tenison Woods, who stated that well-sinkers in South Australia have observed that a layer of flint is always found immediately above the water-level. The factor of an impermeable layer inducing deposition of diffused silica is an important one, and is strongly supported in those instances where I have had an opportunity of observing it.

FREDK. CHAPMAN.

National Museum, Melbourne, Victoria,
August 17.

Butterfly v. Wasp.

I HAVE spent a good many hours lately in a Devonshire garden in which there was a border of massed mauve asters which was a great attraction to butterflies. The border measured 27 ft. by 2½ ft. only, but it was no unusual thing to see on it 150 butterflies—Peacocks, Red Admirals, Tortoiseshell, Clouded Yellows—a very wonderful sight. The object of my letter is to describe to your readers two "scraps" which I witnessed between tortoiseshell butterflies and wasps, in each of which the butterfly was victorious. The method adopted was the same in each case. The butterfly sprang on to the back of the wasp, the head of each being towards the tail of the other, and a furious rough-and-tumble took place some 6 ft. from the ground. The wasp was unable to use its sting, as the butterfly was on its back, and at the end of perhaps five seconds the butterfly, which had been buffeting the wasp with its wings, dropped to within a foot of the grass, relaxed the hold which it had exerted, and allowed its enemy to drop breathless and beaten on to the lawn.

Nature had taught the butterfly to adopt the same tactics (that of concentrating all its energy on the body of its adversary) which enabled G. Carpentier to win his fight with Bombardier Wells.

ARTHUR F. CLARKE.

The Vicarage, Rochdale, Lancashire.

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The Convolvulus Hawk-moth.

I REGRET that I must ask leave to correct a statement in my letter on this moth in NATURE of September 27. I find that it was not in the present year, but in 1902, that the lady counted seven convolvulus hawk-moths flying about the tobacco plants in her garden.

HERBERT MAXWELL.

Monreith, September 29.

THE ETHNOLOGY OF SCOTLAND.

IT is as a fighting man that the Scot makes his first appearance in written history; Tacitus depicts him as ruddy in colour, big in body, strong in limb, and Germanic in origin. In 1866, when Huxley¹ described the human remains discovered by Mr. Samuel Laing in a long-cist cemetery at Keiss, Caithness, which the discoverer regarded as of early Neolithic date, but which are now rightly assigned to a much later period—an early phase of the Iron age—he had clearly reached a conclusion very similar to that of Tacitus:—

But the existence of a tall, long-headed, fair element becomes intelligible at once if we suppose that long before the well-known Norse and Danish invasions a stream of Scandinavians had set in to Scotland and Ireland and formed a large part of our primitive population (p. 134).

Huxley regarded the Scottish people, the Irish, the Norwegians, and the Swedes as possessing a common basal stock or type. Prof. Bryce, of the University of Glasgow, who has done so much to build up an accurate knowledge of the early inhabitants of the south-west of Scotland, accepts Huxley's hypothesis, and supposes that in early Neolithic times—before the long-barrow people, of Mediterranean origin, had reached Arran—Ireland, Scotland, and Scandinavia were already peopled by the same tall, fair, dolichocephalic stock.² Dr. W. C. Mackenzie³ has also come to a somewhat similar conclusion from a study of the place-names of Scotland and Ireland, but supposes that the arrival of the Scandinavian or Germanic people occurred at a post-Neolithic date. The same hypothesis has also been sturdily advocated by Mr. John Munro.⁴

Huxley preferred the term "Scandinavian" to "Germanic" when he wished to designate the tall, big-boned, fair, long-headed Scotsman, because he was well aware that this type prevails only in the western fourth of the modern German Empire. "Celt" and "Celtic," "Teuton" and "Teutonic," "German" and "Germanic," are terms which the modern anthropologist has had to abandon; all have been applied to the type of man Tacitus and Huxley had in mind, and also to physical types which are totally different. To the tall, long-headed Xanthochroi most modern anthropologists would apply the term "Nordic" in preference to "Scandinavian."

When we seek for evidence as to the time and manner in which the Nordic type reached Scot-

¹ "Prehistoric Remains of Caithness." By Samuel Laing, M.P. (1866.)

² "The Cairns of Arran." Proc. Soc. of Antiq. of Scotland, 1902, p. 75; *Scottish Historical Review*, 1905, p. 275.

³ "The Races of Ireland and Scotland." (1916.)

⁴ "The Story of the British Race." (1899.)

land we naturally turn to the three Scottish universities which have become centres of anthropological investigation—Edinburgh, Glasgow, and Aberdeen. We shall take the last-named university first, because the school of anthropologists which has grown up under Prof. R. W. Reid, Dr. Alexander Low, Mr. James F. Tocher, the late Dr. W. R. Macdonell, and the late Mr. John Gray can show us very precise and remarkable facts bearing on the early history of the people of the north-east of Scotland.⁵ All over the county of Aberdeen are found burials in short stone-cists, which certainly date back to an early stage of the Bronze age, and have been given an approximate date of 1500 B.C. by the Hon. John Abercromby. There could not be a sharper contrast between two human types than there is between the Nordic and those squat, bullet-headed, short-cist people of Aberdeenshire. The latter were a wonderfully uniform folk, showing a peculiar type of brachycephaly. To find the nearest approach to that type in a modern population we have to go more than a thousand miles away, to the countries lying at the upper waters of the Elbe and Rhine. In the ancient graves of these same areas of central and south-west Germany the Hon. John Abercromby finds the prototype of the "beakers" which were so often placed in the Aberdeenshire short cists with the dead. Between 3000 and 4000 years ago Aberdeenshire was invaded by a brachycephalic, Slav-like people. We have ample evidence to show that the round-heads of Central Europe broke through the Nordic barrier that still guards the eastern shores of the North Sea about the end of the Neolithic period, some 4000 years ago. Nor need we hesitate to believe that they had the means to cross the North Sea. In that great work,⁶ whereby a foundation for a real history of the Scottish people was laid, Sir Daniel Wilson describes the discovery of a boat at a depth of 15 ft. in the carse of Falkirk. The boat was 36 ft. long and 4 ft. wide. We know approximately when the silt of the carse was deposited and the boat embedded; it was when the 25-ft. beach marked the level of the sea and when the hunters of Scotland used that peculiar form of harpoon which marks the transition from the Palæolithic to the Neolithic civilisation. There were apparently birch boats in Scotland several thousand years before the Continental or German round-heads landed on the shores of Aberdeenshire.

Unfortunately the anthropologists of Aberdeen University can show us nothing of the people who preceded the round-heads or of the people who followed them. But they have provided us with the means of ascertaining how far the stock introduced by the short-cist people has been perpetuated.⁷ In 402 men examined by Mr. John Gray and Mr.

James Tocher there were only 5 per cent. who had the peculiar head form and dimensions of the short-cist people; there were 9 per cent. who were technically of the round-headed type with a cephalic index of 80 or more. The prevailing forms varied between the upper limits of long-headedness and the lower of round-headedness. These modern Buchan people were, on an average, about 4 in. taller than the short-cist men and had the fair colouring in hair and eyes of the modern Bavarian. How and when the Nordic type reached Aberdeenshire we have no precise evidence. But it certainly is at present the prevailing type.

We come now to deal with the contributions which the late Sir William Turner, principal of the University of Edinburgh, made to Scottish ethnology. He may be described as one of the best Scotsmen ever born south of the Tweed. When he arrived in Edinburgh in 1854, at the age of twenty-four, to assist Goodsir, he found Daniel Wilson, who had opened so brilliantly the first chapter of Scotland's ancient history, on the point of departure for the University of Toronto, of which, in the course of time, he became the distinguished principal. Another young Englishman, the late Dr. John Beddoe, had just finished his first preliminary survey of the Scots: he found them to be a compound of Saxon, Pict (Iberian), Celtic (a hybrid between the British of the Neolithic and Bronze ages), and Welsh. Turner had a predilection for facts rather than theories, and he began to collect, in a systematic manner, the materials for a craniological history. His numerous pupils became willing assistant collectors, and in the course of fifty years he assembled in his museum the most extensive collection of ancient and modern Scottish crania that has as yet been made. When he retired from the chair of anatomy, to assume the onerous duties of principal of the University of Edinburgh, he devoted his spare hours to the study of his cranial collections. He published two monographs⁸ on the Scottish crania, the first, issued in 1903, being a detailed description of 176 skulls of modern people; the second issued in 1915—a few months before his death at the age of eighty-four—in which he gave an account of prehistoric crania and stated his conclusions regarding the races which had become fused to form the Scottish nation. He had, including the Aberdeenshire series already mentioned, forty-nine skulls from short stone-cists, representing Scotsmen of the Bronze age. Of the forty-nine, thirty-eight were discovered in the eastern counties; of these, thirty-four were brachycephalic, of a type very similar to the Aberdeenshire series, yet showing a sufficient degree of difference to lead one to suspect that there was at least a tribal distinction.

Turner agreed that the people buried in the short stone-cists were Alpine or Central European in origin and represented the Bronze-age

⁵ See Proceedings of the Anatomical and Anthropological Society of Aberdeen University of December, 1902, and subsequent dates.

⁶ "The Archaeology and Prehistoric Annals of Scotland." By Daniel Wilson. (1851.)

⁷ "Physical Characters of the Adults and School-children of East Aberdeenshire." By John Gray and James F. Tocher. Journ. Roy. Anthropol. Inst., 1900, vol. xxx., p. 104.

⁸ "Contributions to the Craniology of the People of Scotland." Part i. Trans. Roy. Soc. Edin., 1903, vol. xl., p. 547; part ii., 1915, vol. li., p. 171.

invaders of Scotland. Of the more ancient Scots, those who buried their dead in chambered cairns in the latter part of the Neolithic period, he had only ten examples, five of these being borrowed from Prof. Bryce's Arran series. These chambered-cairn men are as different from the short-cist men in head form as men can be; the people from the chambered cairns have the same cranial-shape and dimensions as the people of the long barrows of England. Turner accepted the opinion that both were of the same race and that they were traceable to a Mediterranean stock. One cannot help being impressed by the length and relative narrowness of the face of the more ancient Scottish skulls; we seem to see in them already the peculiar traits so common in the faces of modern Scots.

Sir William Turner had at his disposal two crania which may possibly belong to an earlier date than the skulls from the chambered cairns. They were found by the late Dr. Joseph Anderson, when he discovered and opened the MacArthur cave at Oban in 1895. We know that the MacArthur cave was inhabited at the very earliest phase of the Neolithic period, but as one of the skulls was on the floor of the cave and the other—a very remarkable skull—was only embedded in the upper shelly stratum, we cannot be certain that they represent the ancient inhabitants of the cave. They are both of the Neolithic Scottish type. The more deeply embedded cave skull has a remarkable resemblance to that of Robert Burns; as seen in profile they are almost identical. The cave skull has the remarkable length of 205 mm., that of Burns 206 mm.; they are almost identical in height of vault, but there is a decided difference in width—that of the cave skull being 138 mm., while Burns's cranium had a width of 155 mm. The poet had an enormously capacious skull. The essential differences between the few Neolithic Scots we know of and their modern successors lie in an increased stature and an increased width of head in the latter.

Of the people who lived in Scotland in the early Iron age, the people who succeeded the short-cist round-heads, Sir William Turner had to own we know almost nothing. They apparently burnt their dead. But he accepts on faith that with the introduction of iron a Celtic people came—a long-headed race, which gave the modern impress to the Scottish type. It is possible, as Sir William Turner agreed, that the human remains discovered by Dr. Edward Ewart on the shores of the East Lothian in 1911 may represent people of the early Iron age; in all their physical characters they are akin to the Scots of the Neolithic period. When Sir William Turner came to examine the skulls of the modern Scottish people he found that the cemeteries on the East Coast—particularly in Fife and in the Lothians—carried convincing evidence that the short-cist stock was not extinct. In some cases—particularly in Fife—there were communities in which the round-heads still formed 50 per cent. of the inhabitants and more; of seventy-

nine skulls from cemeteries in the Lothians 25 per cent. were brachycephalic, while amongst thirty-one skulls from Renfrew, on the western side of the country, there was not one. The course of twenty or thirty centuries had failed to diffuse the round-headed invaders of the Bronze age among the more ancient long-headed people of the west. He admitted that there must be a Welsh, a Danish, a Scandinavian, and a Saxon element in the modern Scottish, but he would have been the first to admit that the origin of the real bulk of the Scottish people—the descendants of Gaelic-speaking ancestors—remains still an enigma.

We have now to turn for a moment to the conclusions reached by the Anthropological School of the University of Glasgow. From his exploration of the chambered cairns of Arran and of the south-west of Scotland Prof. Bryce draws certain definite inferences.⁹ He finds the prototype of their burial cairns in the north of Ireland; we may infer that 4000 years ago or more there existed already a connection and intercourse between the peoples of the north of Ireland and the south-west of Scotland. He agrees that these chambered-cairn Neolithic folk were of the Mediterranean stock; their culture is of the South. He is further of opinion that when these cairn people were entering the back door of Scotland on the west the short-cist, round-headed people from the Continent were entering the front door on the east. The east and the west met in Scotland, but to what degree they mixed we have already seen from Sir William Turner's investigations. How far the west was left untouched by the round-heads, and the extent to which the English and the West Scottish have been evolved from a mixture of similar human stocks, have been brought out vividly by the investigations of Dr. Matthew Young, at one time assistant to Prof. Bryce. In 1916 Dr. Young published a monograph¹⁰ describing the dimensions, characters, and variations seen in a collection of skulls—above 600 in number—derived from a comparatively modern burial ground in Glasgow. In this swatch of the modern population of that great city he found that the round-heads amounted to only 2.2 per cent., against 25 to 30 per cent. presented by several cemeteries on the East Coast. The most remarkable result of his labours, however, was the discovery of a close similarity between the Glasgow skulls and the collection from Whitechapel described by the late Dr. W. R. Macdonell. The degree of resemblance will be seen by comparing some of the chief mean measurements of skulls of adult males:—

	Max. length mm.	Max. width mm.	Average height mm.	Bizygo- matic width of face mm.	Length of upper face mm.
Glasgow ...	187.5	139.5	117.0	127	70.9
Whitechapel	189.06	140.6	114.59	130	70.1

⁹ *Scottish Historical Review*, April, 1905, p. 275; *Proc. Soc. of Antiq. of Scotland*, 1902, p. 75.

¹⁰ "A Contribution to the Study of the Scottish Skull." *Trans. Roy. Soc. Edin.*, 1916, vol. li., p. 347.

We are not surprised to note that the Scottish face is somewhat longer and narrower, but we were not quite prepared to find that the Londoner had the larger head. Nor need we really be surprised to find so close a similarity between samples of the population culled from the Clyde and from the Thames estuaries when we remember that since the close of the Bronze period British invaders and immigrants have invariably been members of the Nordic stock. We do not know when that stock first settled in Britain, but it is difficult to account for all the facts now at our disposal unless we accept Huxley's hypothesis that it reached Britain very early—probably, as Prof. Bryce supposes, at an early Neolithic or even more ancient date.

A. KEITH.

THE BEGINNINGS OF PORCELAIN IN CHINA.

IN a charming series of essays on "Fallen Idols," the late Mr. M. L. Solon, of Stoke-on-Trent—one of our most learned students of the history of ceramics—discussed some types of antique pottery which he ranked among the "transient glories of the world," because at one period these vessels, made from common clay, were the idols of the hour, and exceeded in value vessels made from the most precious materials. The idols were but fleeting fashions which have now lapsed into obscure tradition. It is the work of the archaeological ceramist to inquire into the nature and character of the pottery of ancient days. In many cases the greater the obscurity and the fewer the number of available facts, the more persistent have been the attempts to illumine dark and hazy tradition by extravagant conjectures. By a curious aberration of the human mind, the absence of positive evidence is very prone to engender assurance and confidence; this condition has ever been an *ignis fatuus*, luring the unwary into quagmires of fancy. What whimsical and grotesque views have grown about the murrhine vases, the *ollae fossiles*, and the buccaro vases! What curious myths have been current with respect to the origin of Chinese porcelain!

It is a pleasure to read Laufer and Nichols's brochure¹ on the beginnings of porcelain in China because here positive evidence occupies an all-important place. The essay should be read in conjunction with Laufer's "Chinese Pottery of the Han Dynasty." The materials for the latter work were collected by Laufer while on a mission in China about 1903 under the auspices of the American Museum of Natural History, and this work was supplemented by a later investigation in China about 1910.

The composition of the Han pottery, as represented by chemical analyses, is a close approximation to that of the better-class Chinese pottery, and the inferior quality of the body of the former

appears to be due to the primitive methods of manufacture prevalent in China during that epoch. The porosity, for example, is much greater than that of ware which is usually styled porcelain; indeed, the authors go so far as to call the body a "porcelain froth." This term, of course, is merely a metaphor and is no doubt intended to emphasise the low porosity of the ware. According to Nichols, the *outside* of one vessel he examined was coated with a white slip, and on this was superposed a red glaze. The *inside* of the vessel was coated with a glaze which appears to have been made by mixing the body material with limestone—in the approximate proportion of one of limestone to two of body. Analyses of the green glaze of another specimen correspond with a glaze of the Rockingham type, but without "alumina," and the colour is due to the presence of about 3 per cent. of copper oxide. The crude character of the body is taken to mean that the Han pottery is the "forerunner of true porcelain," and that

it represents one of the initial or primitive stages of development through which porcelain must have passed before it could reach that stage of perfection for which the Chinese product gained fame throughout the world.

Although many students of pottery consider that true Chinese porcelain first appeared in the Ming dynasty about the fourteenth century, and others carry it back to the Sung dynasty about the tenth century, there are several references to porcelain at an earlier period still—e.g. the seventh century—but the controversy on the origin of Chinese porcelain now turns on the meaning which the Chinese assigned to the term *ts'e*, and on the definition of porcelain. If the Han pottery is a porcelain, we can accept Laufer and Nichols's conclusion, and the beginning of porcelain would be carried to near the beginning of the Christian era; but did the term *ts'e* refer to ordinary pottery or to porcelain? There is no mistaking Laufer's view:—

By arguing that in the beginning the term *ts'e* denoted nothing but ordinary pottery we close our eyes to the real issue and act like the ostrich; in this manner we utterly fail to comprehend the process of evolution of porcelain.

He claims that the term *ts'e* refers to a porcelain-like pottery and should be translated by "porcelaneous ware" or some equivalent term, and that the early *ts'e* is represented by the Han pottery. This is scarcely the place to argue this matter, because so much depends on the meanings of the terms employed. The present writer, who knows nothing of the Chinese language, has always taken the early *ts'e* to have been a general term which covered *both* ordinary pottery and porcelain. Laufer's general conclusion that the Han pottery was the immediate precursor of porcelain will no doubt be generally accepted, because the experience gained with this pottery would naturally point the way to the manufacture of higher types of ware. I have shown several experienced men some fragments of the Han pottery which

¹ "The Beginnings of Porcelain in China." Publication 102 of the Field Museum of Natural History, Anthropological Series, Chicago, vol. xvi., No. 2, 1917.