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Contributors

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April 10

TREPHINATION OF THE LIVING HUMAN SKULL IN PREHISTORIC TIMES.

*Being an Address given before the Listerian Society of
King's College Hospital on January 17th, 1923.*

BY
T. WILSON PARRY, M.A., M.D.CANTAB., F.S.A.

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An Address
ON
TREPHINATION OF THE LIVING HUMAN SKULL
IN PREHISTORIC TIMES.

SIXTY years ago not even the most eminent scientist in Europe was aware of the fact that, in prehistoric times, our primitive ancestors used to trephine the living skulls of their fellow tribesmen with implements made of stone. The knowledge of this was rendered possible by a discovery made by a general medical practitioner. And here I should like to say that such of you as are about to enter general practice will find, I think, this branch of our profession of a peculiarly satisfying nature, in that not only does it have for its aim the carrying out of ethical ideals by sound practical methods, but there is scope, at leisure moments, for the study of those wider interests that do not actually belong to our profession, but which are stimulated by the atmosphere created by our education, trend of thought, and environment.

Prunières, a general practitioner of Marvejols in the department of La Lozère, France, was a man who spent much of his spare time in antiquarian research. While examining a large dolmen, near Aiguères, in 1865, he discovered a skull with a curious hole in it. The hole had smooth, shelving edges which looked as if they had been polished. Prunières was puzzled as to the nature of this hole and came to the conclusion that, finding the skull in a dolmen, it had belonged to a Neolithic savage and had been converted into a drinking cup, a custom which not infrequently exists among savage tribes, and that this smooth-faced hole had been specially designed for the application of the lips. Now these dolmens were constructed during the *third* or Carnac stage of the Neolithic period, which ended in north-western Europe about two thousand years before the Christian era. The whole of the Neolithic period is computed to have lasted some twenty thousand years, the third and last division probably occupying from four to six thousand years, so that the age of these dolmens may be estimated as being not less than four and even as much as eight to ten thousand years old—the last word in these megalithic buildings being that magnificent pile known as Stonehenge, which was erected at the beginning of the Bronze Age.

Prunières was not correct in his surmise about the drinking cup. To Broca belongs the credit of explaining that the smooth, polished-looking surface of the sides of the hole in this skull was due to a healing process that had taken place in a wound of the bone during life. After this first discovery many other specimens were unearthed from the dolmens existing in those regions, so many, indeed, as to compel one to believe that, during the latter part of the Neolithic period in France, a fetish of a most extraordinary kind was prevalent among the inhabitants, and this fetish consisted in trephining the healthy human skull for some purpose of a superstitious nature, for none of the skulls showed any sign of either fracture or disease.

And now comes the point when it might very reasonably be asked, How can you definitely prove that these holes, which we now know were made during life, were the result of an operation, deliberately planned and carried out by Neolithic man? Is not this suggestion merely guesswork? Broca, having found out all he could from the nature of the specimen itself, and from the place where it was found, and the associations, turned his eyes in another direction.

Here it may be explained that all primitive tribes, on their way upward from savagery to civilization, pass through the same phases. Every nation starts with its so-called "Stone Age," when the chief material used for the making of their implements is stone. Wood, slate, shell, bone, and teeth are also used during this period. When culture has proceeded farther, metals are discovered, the first being the more malleable ones—copper and tin. By accident or experiment they find that a harder and much more serviceable metal is obtained by blending these two metals by heat, bronze being the outcome—thus the Bronze Age. When iron is discovered a stupendous advance has been made, and the early Iron Age of any tribe denotes that great progress has been effected by that tribe. My point in mentioning this is to demonstrate that if only we study the life and customs of those tribes who are still going through their age of stone culture we are able, by analogy, to explain what our own ancestors did when they were passing through this early stage of evolution.

Information had been brought by travellers from certain of the South Pacific islands that the natives there actually performed this operation, at that time, on their living comrades with implements made of obsidian, shell, or shark's teeth. Since the white trader had visited those islands and introduced glass bottles—unfortunately usually in the form of whisky receptacles—the natives had manufactured implements from this glass and used these in preference to those of obsidian formerly employed. Broca had heard tales of this, and he actually made an experiment on a dead infant's skull with a piece of sharp-edged glass, and found that a hole could be made quite quickly and easily by its means. Broca had, however, only been imperfectly informed, as he came to the conclusion that all these trephine holes, in the many specimens found in France, had been made when the subjects were infants. He had not been told and he did not believe that the operation was actually performed during life on adults.

EXPERIMENTS TO DEMONSTRATE METHODS OF PRIMITIVE TREPHINATION.

Ten years ago, in order to get a correct and practical understanding of how primitive man (Neolithic and Modern) performed this operation, I began a series of some fifty experiments on both recent and dry human skulls with all the primitive implements that have been used for the purpose—namely, flint, obsidian, shark's teeth, shell, glass, and even slate. The only material likely to have been used in north-western Europe was stone, and the kind of stone best suited for the purpose is flint. Flint is, as you are well aware, of sedimentary formation, and it possesses the power when force is brought to bear upon it in a certain way of being split into flakes. These flakes can be made, according to the skill of the knapper, with sharp points and edges, and make excellent knives, saws, scrapers, and borers, such as would be required in any primitive household. Neolithic man also constructed most exquisitely shaped arrow-heads, spear-heads, and javelin-heads, for defence of the home and offence in the hunting and fighting field.

With these crude implements at his disposal Neolithic man, in different parts of the world, conducted this somewhat hazardous operation without anaesthetics, without antiseptics, and with dressings which would have shocked the susceptibilities of any member of the Listerian Society. And yet with all these drawbacks he got, like the present-day quack, amazing successes. I make out there were four principal methods by which he performed this operation—namely: (1) by scraping the bone (Figs. 1 and 2); (2) by boring a circle of holes and sawing the intervening spaces (Figs. 3, 4, and 5); (3) by furrowing the bone by the push-plough method (Figs. 6, 7, 8, 9, 10, and (?) 11); (4) by sawing out a quadrilateral button of bone (Figs. 12 and 13).

1. *Scraping.*

Whether the scraping be done by flint flakes, sharp-edged pieces of obsidian, or pieces of strong sharp shell, such as are found on the shores of the South Pacific islands, the principle and method of procedure are precisely the same. For scraping a hole in bone, metal not being considered, there can be no better natural implement than a well flaked piece of flint. Where flint cannot be obtained, as in volcanic regions, obsidian makes a good substitute. Obsidian is a natural volcanic glass and can be flaked in the same way as flint by a sharp, well directed blow. The obsidian I used came from the Lipari Islands, north of Sicily. Contrasting these two substances I would give flint the first place. A hard, sharp edge can be obtained in flint, which is more resistant to counter-pressure than is obsidian. Obsidian, like glass, can give an even sharper edge than flint, but it is much more brittle and the operator stands in some danger as regards his eyes, from the sharp spicules that fly in every direction. I may recall that while flint is a siliceous sedimentary deposit, obsidian is of igneous formation; both flint and obsidian, when freshly flaked, are excellent substances for surgical purposes. Their newly fractured surfaces, which are smooth—and in this

respect obsidian would take pre-eminence—are aseptic, and this is a point of great practical value of which the primitive operator stood in blissful ignorance. It surprised me at first, in no small measure, to find how cleanly and easily a flint knife could cut through the scalp, and obsidian I found equally as good if not better. At the present day the natives of the Andaman Islands shave their heads with obsidian knives. The method I employed for scraping the trephine-hole with both flint and obsidian was the following. Having made a V- or Y-shaped incision in the scalp, as is done by the primitive Melanesians, over the selected site of the operation, I scraped as nearly as possible along a single line on the bone with a flint flake, which I held between the thumb and forefinger of my right hand. [Although Sir John Evans believed that our Neolithic ancestors used to haft some of these small flakes, I am convinced that no hafted implement was used in this case. This can be substantiated by the Melanesian method employed in these days, when the obsidian flake or piece of glass is held between the finger and thumb.] This line I gradually converted into a groove, which soon showed two more or less prominent ridges. The outer table of the skull is by no means as easy to remove in this manner as might be expected. The next step was to attack the edges of the groove with a curved movement of the scraper till a depression was produced in the bone, which gradually assumed an elliptical shape. It is now only a question of time and manipulation to convert this elliptical depression into a circular one, and thence, having penetrated the inner table of the skull, to expose the dura mater and enlarge the foramen in the bone to the size and shape required. In only one case can I remember slightly damaging the dura mater, and the reason of this was that my supply of Neolithic implements was limited and I had not to hand at the moment the particular shape I required. It must be remembered that when Neolithic man did this operation he would be bountifully supplied with probably hundreds of sharp, newly cut flakes, and immediately one became blunted, or was not to his fancy in any other way, he would naturally fling it aside and choose another. The average time taken by me to do this operation on a fresh adult skull was half an hour.

Trephining by shell was probably never attempted by Neolithic man in Europe, as our shells are not nearly strong enough to compete with such a substance as flaked flint, of which we possess a remarkable abundance. Primitive man, in the South Pacific islands, most certainly used shell for trephining, shell knives for ordinary use, and shell lancets for opening abscesses. I experimented, however, with an ordinary beach-worn oyster shell, and found I was able to trephine the skull of a 9-months-old infant in about twenty-five minutes, and, to my amazement, with a larger and stronger shell I made a large hole in the somewhat soft skull of a Maori in thirteen and a half minutes. What could not, therefore, be done with some of the powerful shells that are so prevalent among the islands of the South Pacific Ocean?



FIG. 1.—The "Thames" prehistoric trephined skull.
(London Museum.)



FIG. 2.—Experiment showing method of scraping skull.

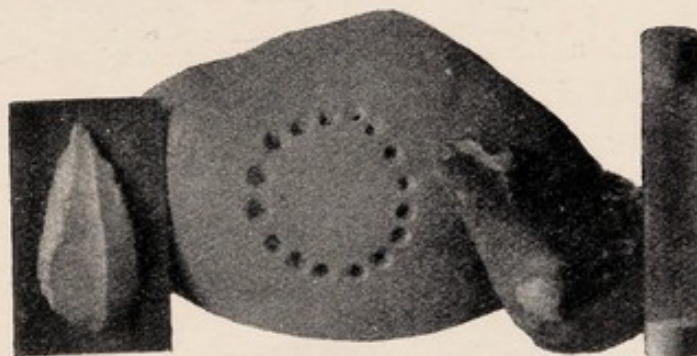


FIG. 3.—Boring and sawing by hand borers.

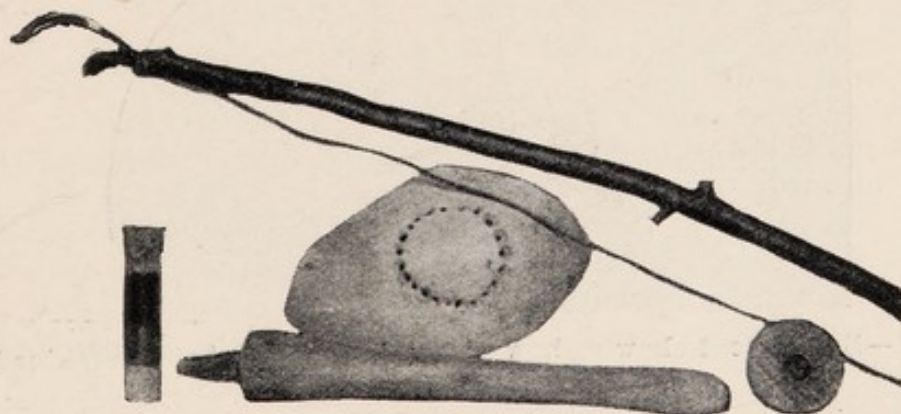


FIG. 4.—Boring and sawing by mechanical borer (bow drill).

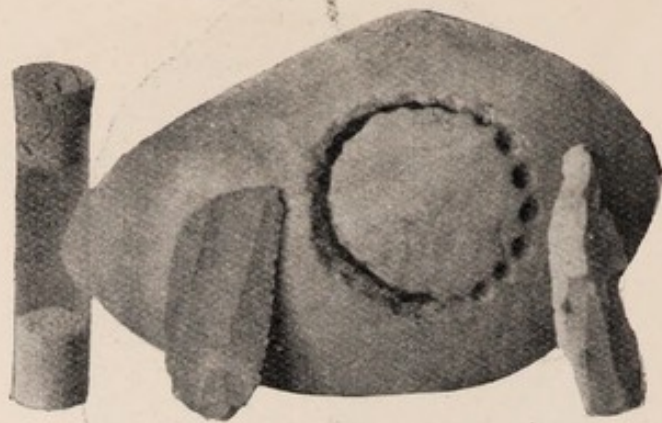


FIG. 5.—Boring and sawing. Final stage of either of the two former methods.

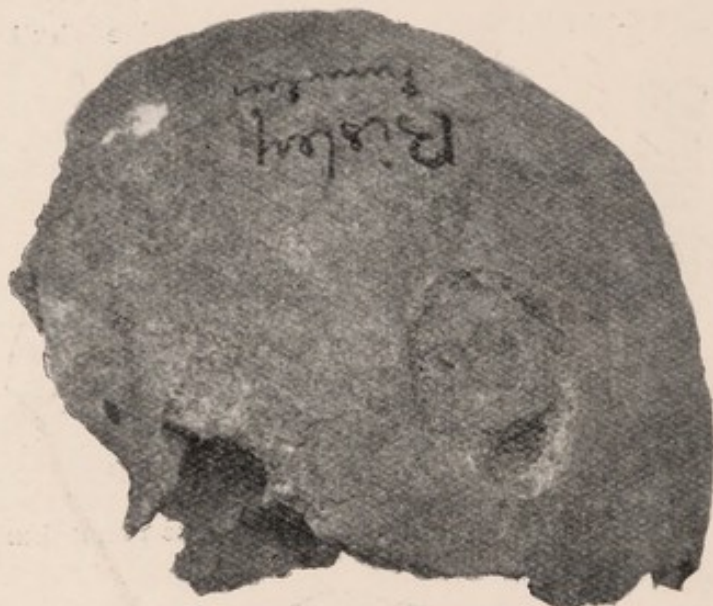


FIG. 6.—Trephined Neolithic frontal bone from a long barrow, near Bisley, Gloucestershire.

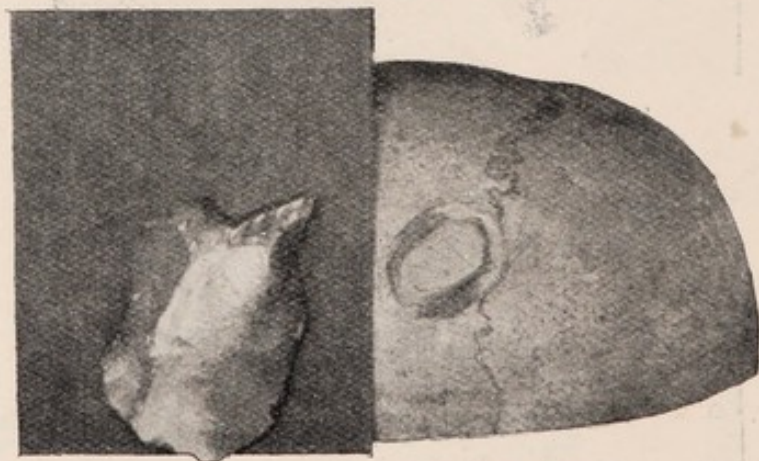


FIG. 7.—Experiment showing how Bisley skull was probably trephined.

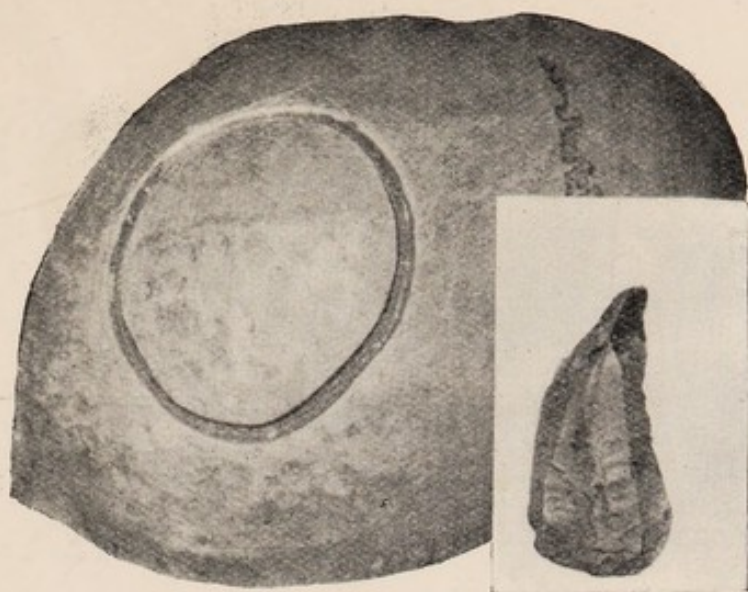


FIG. 8.—Push plough method First stage.

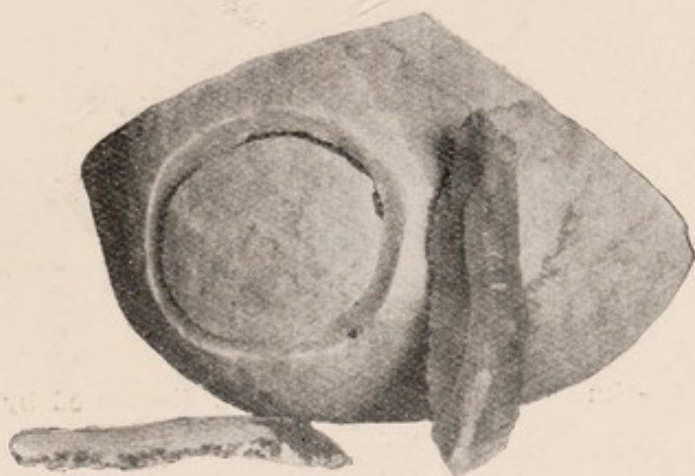


FIG. 9.—Push-plough method. Second stage.

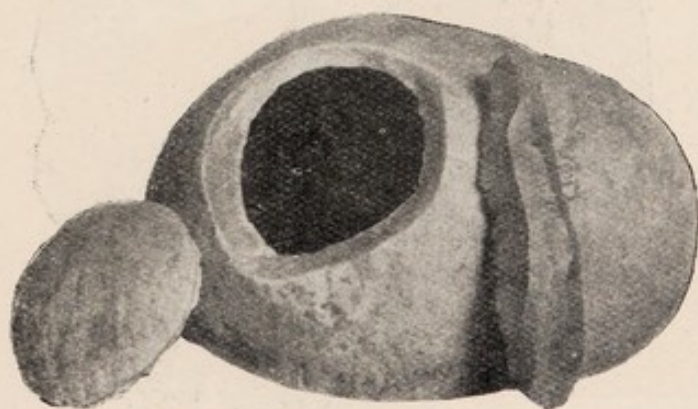


FIG. 10.—Push-plough method. Final stage.

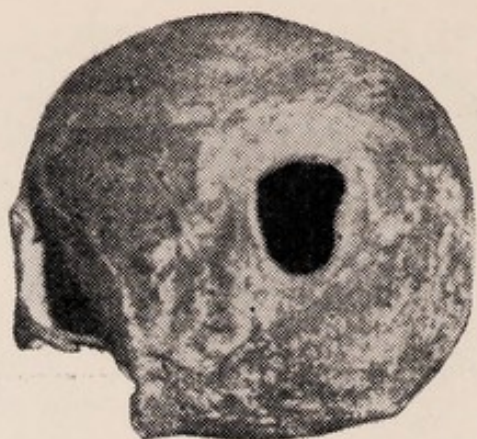


FIG. 11.—The "Edinburgh" prehistoric (?) trephined skull.
(Wellcome Hist. Med. Museum.)



FIG. 12.—Skull of prehistoric Peruvian, discovered by Mr.
E. G. Squier in 1867.

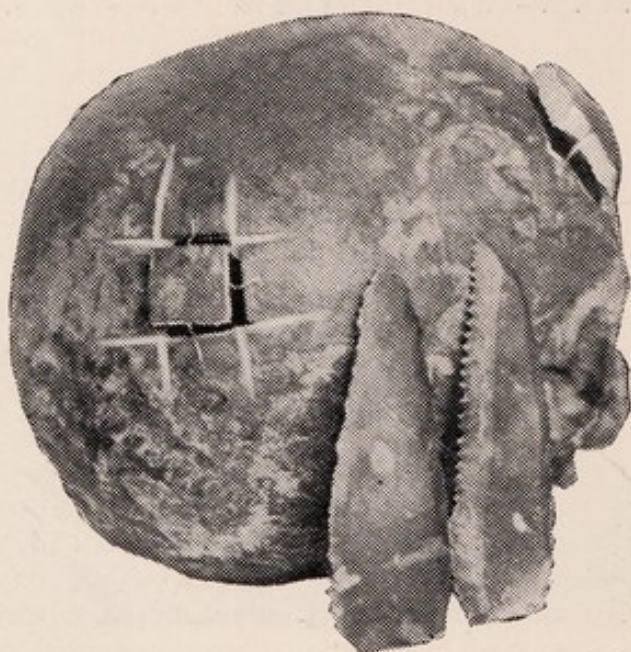


FIG. 13.—Experiment on dry skull, with flint saw, to show how
the Incan skull had been trephined.

2. Boring with Sawing.

Whether hand flint borers (Fig. 3), hafted flint borers, flint-tipped mechanical borers (Fig. 4), or hafted shark's teeth be used, the method employed is precisely the same. A series of holes, packed as closely together as possible, were bored in the form of a circle. These would number perhaps from fifteen to twenty-two, according to the size of the bone required to be removed. Having done this the bridges of bone between the holes would be cut through either by the side-to-side action of a strong flint flake or by means of a flint saw (Fig. 5). The enclosed rondel of bone was then liberated. This is a very arduous operation, especially if the holes are made by a hand borer (Fig. 3). A hand borer is a flint implement tapering to a point, held either directly in the hand or hafted into a wooden handle and used as if it were a clumsy bradawl. A quicker and much more effective method of drilling holes was most probably used. The bow drill (Fig. 4) is one of the oldest mechanical contrivances in existence. Canadian Indians, in pre-Columbian days, used one of these, without having any hard material affixed to its end, to make fire by friction against another piece of wood, touchwood or dried leaves being placed in near proximity to catch the spark. With a sharp point of some hard material this contrivance was used for drilling holes. I show you a lantern slide of an Incan skull on which this operation has been performed. I think the regularity of the holes and their proximity to each other will convince you, as it has convinced me, that they have been bored by mechanical means. This operation takes a considerably longer time to perform than one done by scraping, but, of course, a much larger hole can be made. It took me twenty-five minutes to do the first stage alone (drilling the circle of holes) on the cadaver of a male 68 years of age, and it took me sixty-five minutes to remove a rondel from the skull of a female 40 years of age.

Another method of boring holes, and one which was formerly used in Melanesia, was by shark's teeth. As regards shark's teeth as surgical instruments, I am satisfied that, metal being again excluded, there is no more excellent natural implement for boring holes in bone than a hafted shark's tooth. Its keenly serrated edges and its strong, sharp point make it an instrument invaluable to the primitive surgeon. It moreover possesses a natural flange, which converts it into a trephine of undeniable utility, for the flange is so placed as to prevent the point penetrating too deeply into the thickness of the bone to the wounding of the dura mater. A ring of holes, packed closely together as before, followed by the breaking down of the bridges between them by a scraping and saw-like action of the implement, makes a hole, after removal of the rondel, with which any surgeon may be happily satisfied. Although it took me only twelve minutes to do this operation on the skull of an infant aged 14 months, it took me one and a quarter hours to do the first stage only of the same operation on an adult dry specimen and one and three-quarter hours to do a complete operation on another dry specimen.

3. *The Push-plough Method.*

Coming under neither of the two previous heads (scraping or boring) is, I am convinced, another primitive surgical procedure to which I find no reference in the literature of the subject. Lucas-Championnière does not successfully tackle the problem of how those skulls, found in the French dolmens, exhibiting extremely large trephinations, were operated upon to produce such extraordinary effects. As the edge of the trephine ring shows a partial healing process they cannot be classed as examples of *post-mortem* mutilations of the skull for the purpose of making amulets. In the Museum of the Royal College of Surgeons casts of some of these skulls can be seen, and it fills one with amazement to consider the daring of the primitive surgeon, a feeling which, unfortunately, is mingled with a lack of admiration for his quality of judgment. Lucas-Championnière was inclined to believe that those trephinations that were not done by scraping were done by boring and sawing in the way we have already described. Now no one could possibly imagine that these large trephinations of which I speak were done merely by scraping the bone with a flint scraper; they are much too large for that, consequently it is inferred they were done by the boring method.

It is inconceivable to me that a large boring operation could be performed without there being left behind indisputable evidence of this method having been employed, for when the bridges of bone separating the perforations are cut through a large very ragged ring, comprised of half-holes and half-bridges, remains to tell the tale of how the rondel had been removed. No amount of new bone formation could completely obliterate this. It is possible, I grant, that by extending an already abnormally long operation the surgeon, by a special scraping manipulation, could have done this. But was this likely? In a carefully planned burglary the expert thief thoughtfully leaves behind no trace of his criminal work whereby he may be identified. The Neolithic surgeon was not placed in this position. An operation of this kind would take some hours' hard work, and even if the patient had not become weary of it the surgeon himself would begin to show signs of fatigue and would not be anxious to prolong the proceeding merely for aesthetic reasons.

In the Geological Section of the Museum of Lisbon is a cranium that was taken from the grotto of Casa da Moura at Peniché in Portugal. This grotto contained the remains of no less than 140 individuals of the Neolithic period. This cranium exhibits an unfinished trephination on the left parietal bone, the piece to have been removed being elliptical in shape, 60 mm. long by 20 mm. broad. There are no signs of reparation, which means either that the patient died before the operation was completed or the surgeon gave up either for his own or the patient's sake. I think we may perhaps best describe it as the first stage of another kind of operation. To me it furnishes a valuable clue as to the nature of the finished operation, which would when completed have represented, in my opinion, the method employed by the "French" Neolithic surgeon to bring about those large

trephinations of which I have spoken. I think this operation was done by pushing forward a beaked flint implement, used in such a way as to first make a line, then a shallow groove, then a furrow, which, when deepened by continually traversing the same direction, eventually would plough through the diploë and reach the inner table of the skull. When nothing but the vitreous layer remained the rondel would be levered out by a stone or bone elevator (Figs. 8, 9, and 10). Professor Sir Arthur Keith, Conservator of the Museum of the Royal College of Surgeons, agrees with me that this was probably the method employed in removing the great pieces of skull bone which specimens prove were actually accomplished—unhappily, alas! not to the benefit of the patient so treated.

4. *Sawing.*

There is yet another method that was made use of in prehistoric times. We have no proof, however, that this method was employed in Europe, in Africa, or in any of the islands of the Australian Archipelago. It was a very dangerous operation, and there is not on record a single case of success. It consisted in sawing out, with a stone implement, a quadrilateral button of bone, by four straight cuts, leaving on the skull a figure closely resembling a parallelogram with extended sides, such as we were wont to draw as children when playing the game of naughts and crosses (Figs. 12 and 13). If the skull were a level plane there might have been a shadow of a chance of success; but, the skull having a contour of its own, it stands to reason that in order to penetrate the inner table of the skull equally in every direction, which was necessary for the removal of a piece of bone, that part of the skull which was most convex would have to be cut deeper than the level of the extended incisions; thus not only would the dura mater, under the convex part, become damaged, but even the brain substance itself be lacerated to the extent of several millimetres in depth. This operation was performed by the Incan and pre-Incan peoples that inhabited prehistoric Peru. The first specimen displaying this operation, brought to the notice of European surgeons in the year 1867, was discovered by Mr. E. G. Squier (Fig. 12). Both Broca and Nélaton examined this skull, the former giving it as his opinion that the patient lived no longer than seven days after the operation, while the latter put it down as ten. This was judged, of course, by the amount of reparation exhibited by the edges of the aperture. I show you a lantern slide of this skull, as well as of two others which were also excavated in Peru.

SHOCK AND ANAESTHETICS.

There is very little shock, I am convinced, with this operation. There is no feeling in bone; if an exposed piece of healthy bone be tapped with a probe the patient does not flinch. Moreover, the scalp has not the keen sensitiveness of other sentient surfaces in the body. I was very fortunate, during the war, in coming across a Polish doctor from Warsaw who had been doing research work on this very subject in Germany, but had been obliged to take refuge in our country.

He would not permit me to make known his name, so I very much regret I cannot give him that personal acknowledgment he deserves in this branch of research. He was working with Dr. Klaatsch of Breslau, who was professor of anthropology in Dresden. He performed operations (primitive and otherwise) on cats and dogs in connexion with trephination (occipital and frontal) to test the amount of shock occurring in connexion with them. Cats and pigs are particularly nervous subjects and show glycosuria on the least provocation of shock. Dogs and rabbits show shock or pain by intestinal contractions; thus shock can be scientifically estimated. The results of the experiments were that no glycosuria occurred from performing the primitive operation of trephination, with flint, on cats, and shock was found to be very slight with the same primitive operation performed on large dogs.

Probably the two earliest discovered anodynes were mandragora and opium, as both these drugs are mentioned in the Papyrus Ebers, which was found near Thebes, and dates from the eighteenth dynasty, about 1500 B.C., some five hundred years after the age of stone culture had closed for France and Great Britain, and indeed for the greater part of Europe. The first mention of opium in Europe is by Theophrastus, which did not occur till 300 B.C. In the first century Dioscorides describes the method of obtaining the juice from the capsules, and Pliny describes its medicinal uses. Dioscorides describes how "Cyprus wine" was made from the mandragora root, and that a dose of it was given to a patient before operating to induce sleep. Among the Swiss lake dwellings a whole cake of the seeds of the garden or opium poppy was found at Robenhausen, but as these seeds are destitute of narcotic properties, which are almost entirely confined to the capsules, the seeds were no doubt pressed for the extraction of oil, or, it has been suggested, they may have been eaten scattered on bread.

About twenty years ago an interesting custom was discovered amongst the Peruvian Indians. They fill a wound with powdered coca leaves, which contain some 9 per cent. of cocaine, and they find after waiting a little while they can do what they like with the part affected without inflicting pain. It is not unlikely that the Incan and pre-Incan races availed themselves of this local anaesthetic when they performed their trephinations, though we have no evidence that this method was used in Europe. Mr. Hilton-Simpson has lately been studying primitive surgery among the Arabs in Algeria. Trephination, which is not at all uncommon there, is always performed without an anaesthetic. He told me that he had witnessed an operation on a young girl, who, becoming restive and noisy, was only silenced into operative subjection by a terrible outpouring of oaths and foul language administered by the operating surgeon himself. I have no doubt that some such hypnotic anaesthetic was employed by the Stone Age medicine man.

DISTRIBUTION OF PREHISTORIC TREPHINATION.

The distribution of prehistoric trephination is *almost* world-wide. It is found in parts of both the eastern and western

hemispheres. It must be understood, however, it was never synchronous in these different regions of the earth, thousands of years sometimes separating the practice in one part of the world from that in another. To give just one example. In this country it was practised some four thousand years ago, while in Melanesia—that group of islands situated in Oceania to the east of New Guinea and Australia—primitive trephination is performed to-day with all the simplicity and crudeness it was practised in prehistoric times thousands of years ago.

There is no doubt that an ethical need for it arose at a certain time among diverse primitive civilizations when in the state of stone culture, demonology, with special reference to epilepsy, being the primary cause of its being first suggested and then practised. Although migration may have had influence upon this strange custom being disseminated, I do not believe it was answerable for its unified spread, the reason being that it was used in one part of the world for an entirely different reason from what it was in other parts. In one part of Melanesia it is actually employed to promote longevity, handsome youths and beautiful girls being specially singled out for its practice.

In the eastern hemisphere Europe has the distinction of being the leading continent, and in Europe France is the first country, by a long way, to be able to exhibit the largest number of specimens of this unique fetish. Great Britain Scandinavia (particularly Denmark and Sweden), Germany Bohemia, Poland and Russia (especially the Caucasian region) Portugal, and Montenegro, have all some skulls to prove its practice in those countries. I know of none that have been yet found in Spain or Italy. Passing over the Mediterranean Sea we find it has been practised in Algeria amongst the Kabyles from very early times, and it is to-day performed by the Arab Shamans, with primitive metal instruments, in the most primitive way, without anaesthetics, without antiseptics, and with the crudest possible dressings. Specimens have been found in the Canary Isles. In Teneriffe von Luschan collected 210 Guanche skulls, ten of which had been trephined. He found others in which the outer table only had been scraped away. Professor Elliot Smith has examined 15,000 skulls from ancient Egypt and Nubia, but tells me he has never found a trephined specimen. I should like to show you a lantern slide of one of them. I have not seen this skull, but the specimen seems to me to so clearly illustrate a depressed fracture that has been treated in this way that I bring before your notice two pictures of it—one a front view and the other a profile one. The Guanches are supposed to have migrated from Egypt, so one would have expected to have found specimens there. It is possible, of course, that the custom was acquired in the Canary Isles after they had been separated from the mainland of north-west Africa.

In Asia, Daghestan can exhibit primitive specimens, and they have also been found in Japan; but the vast area of Asia has hitherto been unexplored from this view-point, and one day, no doubt, other specimens will be unearthed, when new classifications will have to be made.

In the western hemisphere we find no specimen whatever to prove that this operation was attempted on the living skull in North America, but *post-mortem* specimens have been discovered in Michigan, Illinois, and Ohio.

In Mexico, among the ancient Tarahumares, Lumholz discovered two skulls that had been trephined in a primitive manner, one during life and the other after death.

Very many specimens have been excavated in South America, notably in Peru, where the Incan and pre-Incan races practised this art for surgical and most probably for medical and ethical purposes, though not a single human amulet has yet been discovered there. In Bolivia specimens have also been found.

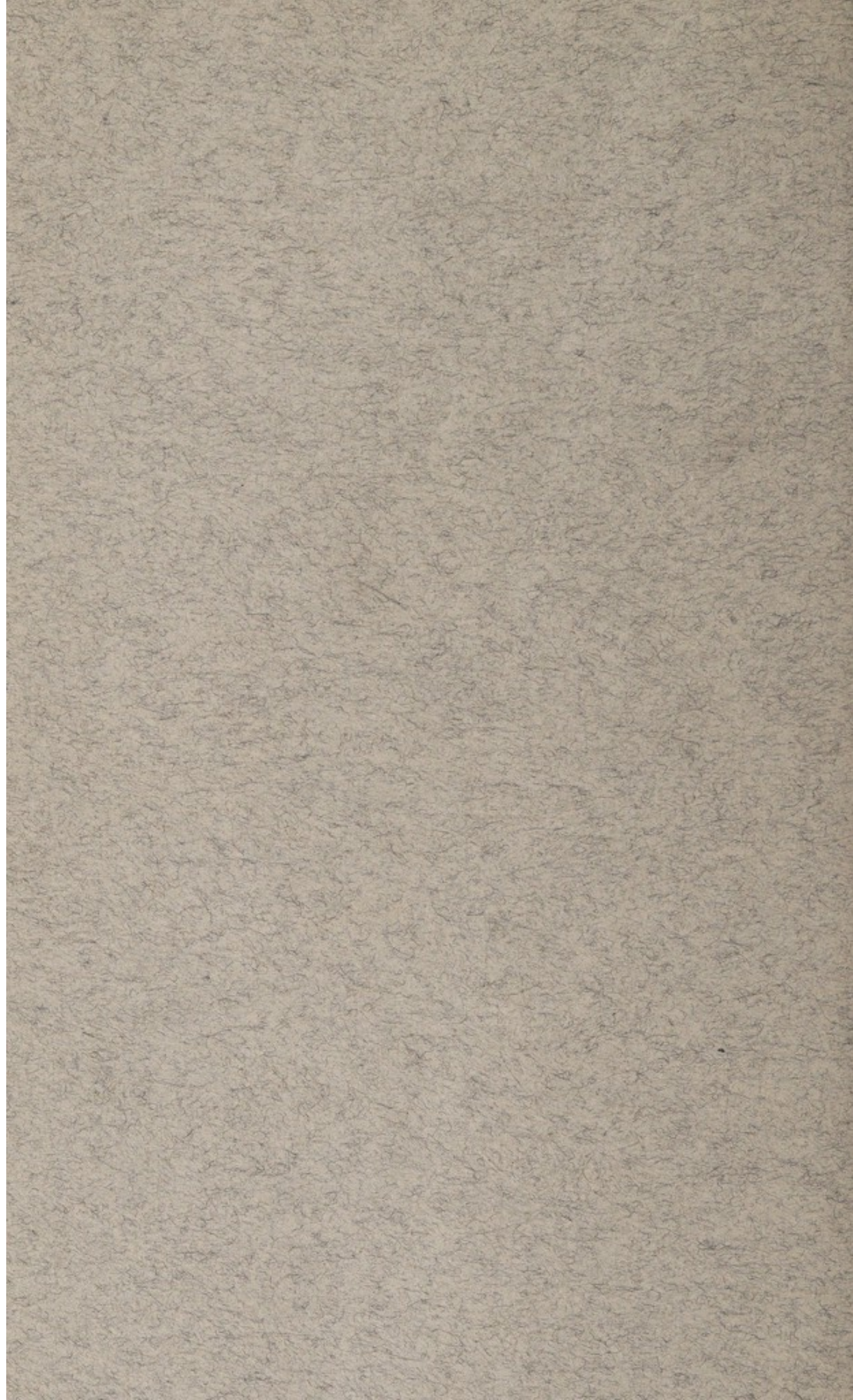
The imaginary line separating the eastern from the western hemisphere cuts through the group of islands in the South Pacific known as Melanesia. In this group it was practised. There are specimens in the Museum of the Royal College of Surgeons from both New Britain (Neu Pommern)—where the operation is performed for fractures only—and New Ireland (Neu Mecklenburg)—where the operation is performed for epilepsy and insanity. In 1874 Ella described an operation that he had himself witnessed in Uvea in the Loyalty group, and as early as 1831 William Ellis described an operation that he had seen performed in the island Bora-Bora in the Society group, over 2,500 miles to the east of the Loyalties. It is still practised in many of these islands, sometimes for fractures of the skull produced by sling stones or by clubs, and sometimes for epilepsy or other head disorders supposed to be caused by demoniacal possession.

I will finish by showing you the lantern slide of a skull mounted in an elaborate glass-sided reliquary, which is to be seen in the cathedral at Avranches in Brittany. The skull is supposed to have belonged to Saint Aubert, who became Bishop of Avranches in the year 708, founded the church on St. Michael's Mount, and died in 725. This skull has a circular hole in it which was supposed to have been made by the forefinger of the Archangel Michael. If you will examine the hole carefully you will find it is an exact replica in size, shape, and shelving edges of one of those holes I have been showing you to-night—a facsimile, indeed, of a prehistoric trephination; and I suggest to you that if it is not what it purports to be it is a Neolithic trephined skull that must have been found in one of the many dolmens that exist in Brittany, the Carnac region of which has played such an important part in European Neolithic history. The individual in question, therefore, who owned this skull must have lived some three thousand years before Saint Aubert, the learned Bishop of Avranches, was born!

REFERENCE.

The Prehistoric Trephined Skulls of Great Britain, together with a detailed description of the operation probably performed in each case. *Proc. Roy. Soc. Med. (Hist. Sect.)*, vol. xiv, No. 10, August, 1921.





H. X. 1927

DIAGNOSIS OF HOLES IN PREHISTORIC SKULLS

A DIFFERENTIAL DIAGNOSIS OF THE VARIOUS KINDS
OF HOLES DISCOVERED IN THE SKULLS
OF PREHISTORIC MAN.

*A Lecture delivered at the Post-Graduate Hostel on
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BY

T. WILSON PARRY, M.A., M.D.CANTAB.,
F.S.A.

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B. III.

DIAGNOSIS OF HOLES IN PREHISTORIC SKULLS.

A DIFFERENTIAL DIAGNOSIS OF THE VARIOUS KINDS
OF HOLES DISCOVERED IN THE SKULLS OF
PREHISTORIC MAN.

"I'll see what hole is here."—

Titus Andronicus Act II., Sc. 4.

IN the year 1897 Dr. Robert Munro, for many years secretary of the Society of Antiquaries of Scotland, published a book called "Prehistoric Problems." In this book were depicted illustrations of a certain skull which had been excavated from an ancient graveyard at Eastry, in Kent. The skull was an extraordinary one, and apart from its curious shape, there were two large holes situated one on either side of the posterior parietal region. Dr. Munro stated that he considered this specimen to be the only example he had seen in Great Britain of a double prehistoric trephination. I made a special journey to Liverpool to see this skull, which was housed in the Public Museum in that city, only to find, however, this was not a trephination at all, nor indeed was it even a prehistoric skull. It was the skull of a microcephalic idiot and the two holes, symmetrically placed, in the region specified were congenital deficiencies in the cranial bones. It is one of those specimens that is liable to be confused with a true trephination of the skull, but can easily be distinguished from it by a careful examination.

The *differential diagnosis* is as follows. In a prehistoric trephination the scraping of the bone produces a slope downwards and inwards towards the lumen, at the expense of the external table of the skull. In a congenital deficiency of bone, the upper part of the wall

of the hole is made at the expense of the outer table, while the lower half is sloped at the expense of the inner table of the skull, the margins of the sides being slightly rounded. In the living skull a membrane stretches across the middle of this opening at its narrowest diameter.

INJURIES TO THE HEAD, EITHER DIRECTLY OR
INDIRECTLY, ARE COMMON CAUSES OF HOLES
IN THE CRANIUM.

I am taking the culture of prehistoric Peru to illustrate this section. The Incas and pre-Inca races of Peru possessed formidable weapons—slings, large wooden clubs, in the ends of which were inserted splints of stone and copper, and hatchets in which both these latter materials were employed. In their graveyards are found skulls upon which these weapons have been generously applied. The prehistoric Peruvian surgeons most courageously attacked these fractures, many of which were of an extensive and dangerous character. They trephined chiefly with stone implements—scrapers, saws and borers, though I myself believe that metal was employed in a few instances. The only metals with which they were acquainted at that time were gold, silver, and copper, and they used a mixture of these which they called “champi.” They made chisels or “estiletas” of this mixed metal.

There have been many other skulls excavated which show no signs of fracture, but on which trephination has also been performed. In my opinion, the reason for such was that the patient suffered from some medical head-symptom. Such disorders as epilepsy, vertigo, severe chronic headache, repeated severe paroxysmal attacks of neuralgia, and other kindred maladies would be the kind of cases dealt with in this way.

The following circumstances prove that the operation in question was performed for disorders such as these and not for ethical, mystic, or ritualistic reasons as was done in Neolithic France.

The religion of the Incas was a truly noble one. “They believed in a Great Spirit, the Creator of the Universe, who, being a spirit, could not be represented by any image or symbol, nor be made to dwell in a temple made with hands. They also

believed in the existence of the soul hereafter and in the resurrection of the body."

Muniz tells us the ancient Peruvians held an almost exaggerated reverence for their dead. Such a thing as the mutilation of a dead man's cranium to obtain an amulet was quite impossible among this people and this, he says, has been conclusively proved by the fact that not a single amulet of the human skull has ever been unearthed from the Inca cemeteries. We will see later that Neolithic France has a very different tale to tell.

DISEASE OF THE BONE CAUSING, IMMEDIATELY OR REMOTELY, HOLES IN THE CRANIUM.

About the year 1887 a finely made cyst of Bronze-age date was discovered at Mountstuart in the Isle of Bute. It contained the remains of a young woman who had not, at the time of her death, cut her wisdom teeth. In the grave was found a fine example of a Bronze-age food vessel, and at the place where lay the bones of her neck were discovered 98 bugle-shaped jet beads, two terminal triangular and four intermediate and rhomboidal plates with a triangular pendant. When re-strung a beautiful example of a Bronze-age necklace was reconstructed. There is no doubt that the hole in the skull was due to disease. How the disease in the bone originated it is impossible to say. There is no sign of any fracture. Dr. Thomas H. Bryce considers it to have been a case of disease from start to finish. Dr. Robert Munro believed it to have been a case of trephination at the outset and disease at the finish. I made a special journey to Edinburgh to see this skull and came to the conclusion that it was a case of necrosis of the bone, a sequestrum of dead bone having formed which I have reasons to think, from the hollowed-out nature of the cavity, had been scooped out by the aid of a flint implement. The surgeon had probably completed the perforation at the base of the concavity and, as likely as not, hastened the end which must have been from a general septic infection.

MUTILATION OF THE SKULL AFTER DEATH.

This section embodies five distinct groups : (a) posthumous trephination ; (b) removal of parts of skull for fashioning amulets ; (c) holes made in prehistoric Egyptian skulls by necrophilous beetles ;

(d) holes made by picks in the process of excavation;
 (e) post-mortem decay of part of cranial bones leading to the formation of holes.

(a) *Posthumous trephination*.—Thirteen years ago I received a welcome invitation from the late Sir Victor Horsley to accompany him on a motor trip to Northampton to pay a visit to the Museum in that place, to examine a skull which had for long been considered the only example of prehistoric trephination in England. The skull in question had been excavated just outside "Hunsbury Camp," Northamptonshire, which is of Early Iron Age date. The trephination was situated on the vertex of the skull and consisted of three circular holes arranged in the form of an equilateral triangle. A glance at this specimen was sufficient to show us that the three holes had been bored by a metal instrument. In my opinion these holes had been bored for the purpose of suspending the skull, probably as a trophy, the result of an Iron-Age tribal conflict. A similar specimen to this from the Hillhead Broch at Caithness, in Scotland, was pointed out to me by Mr. Alexander O. Curle, secretary of the Museum of Antiquities of Edinburgh, when showing me over this Museum.

(b) *Removal of parts of the skull for the fashioning of amulets*.—In the year 1865 Dr. Prunières, while exploring a dolmen near Aiguières, in France, discovered a human skull out of which a large portion of bone, as big as a man's fist, had been artificially removed by cutting and sawing. A small edge of this gap looked as if it had been polished. By the side of this skull he came across five fragments of cranial bones that had been deliberately cut or sawn from a skull for some special object. These fragments, however, would neither fit together, nor would they refill the gap in the skull. They had, indeed, it was shown, been removed from another skull altogether.

It was Prof. Paul Broca, not Prunières, who first pointed out that the piece of the rim of the skull that looked as if it had been polished was actually part of the circle of a trephine ring, the result of an operation conducted during life, the polished appearance being in reality the healed cicatrix of the bone. These five cranial fragments were each found to be possessed of a part with a "polished"

edge, and their remaining sawn sides testified that their removal from another skull or skulls had been brought about after the death of the individual. Later, when large numbers of cranial fragments had been examined from neolithic dolmens in different parts of France, it was found that some were round, some oval or oblong and artificially polished, while others again were just rudely sawn from the dead skulls. Some were bored and others were notched and grooved, so as to facilitate suspension from, probably, the necks of their owners, for the prophylactic purpose of warding off the disease from which it may be presumed the possessor of the original trephined skull had suffered. Broca explained that among primitive peoples there is an anxious desire on the part of the deceased's relations and friends not in any way to vex or annoy the dead man, or his spirit, like the ghost of Hamlet's father, may return to earth to torment them. The amulet having been obtained, the dead man's spirit must therefore be propitiated; so, after taking what was required, a substitute from another skull was inserted in the dolmen; but always more was taken than replaced, so gain was the net result. The whole procedure, Broca shows, was part of an ethical system—strange, complicated, and mystical.

(c) *Holes made in prehistoric Egyptian skulls by necrophilous beetles.*—Two French doctors, Prof. Lortet and Dr. Fouquet, asserted that they had discovered evidence of syphilis in the skulls of prehistoric Egyptians. This evidence was based on the fact that skulls had been unearthed with holes in them and these holes had been described as being due to an "irregular circumvoluted, serpiginous ulceration" that had been present during life.

Prof. G. Elliot Smith¹ made investigations and was able to deduce the following facts:—

1. These irregular holes always occurred in that part of the skull or other bones of the body that were in contact with the soil.
2. They never occurred in the skulls of those that were buried in rock-cut tombs or in coffins.
3. A white powder consisting of pulverised bone was often sprinkled over the damaged part and the adjoining soil; in many cases this was so obviously fresh that its age

¹ THE LANCET, August 22nd, 1908.

could not be more than a few months, whereas the bones had been in the soil for thousands of years.

4. When such a mutilated bone was removed from the soil, burrows of small animals could always be seen leading up to this so-called "ulcer." Fragments of the soil from the walls of these burrows and also that taken from the damaged surfaces of bones were examined by Prof. Looss and found to contain portions of the elytra of beetles.

Prof. Elliot Smith goes on to say that the soil around these so-called "ulcers" is usually converted into a hard cake which firmly adheres to the bone. Such masses usually form a cap over each hole produced by these beetles in the bone and if the cap be removed it is found to be riddled with the burrows of these beetles.

(d) *Holes made by picks in the process of excavation.*—Little need be said of this mutilation of the skull, as it will naturally speak for itself.

(e) *Post-mortem decay of part of a cranial bone.*—The softer part of a bone may become disintegrated more rapidly than the surrounding denser parts, giving rise to central crumbling of the bone which eventually becomes converted into a foramen.

The last section of my classification of the causes of holes in skulls of prehistoric date is the

TREPHINATION OF THE LIVING HUMAN SKULL WITH THE MOST PRIMITIVE IMPLEMENTS AND IN THE MOST PRIMITIVE WAY.

It is a most curious thing that we should find this extraordinary custom practised, at some time or other, in nearly every part of the world. I feel I cannot do better than give an epitome of its distribution in the five continents and in some of the countries where it was employed; but the most curious fact of all is that it was practised in these different countries, many of them widely separated, for quite different reasons and at vastly different times.

To take Europe first:—As regards time, our age of stone-culture ended about 2000 B.C., that in Egypt considerably earlier, while the holing of living skulls is practised to-day in some of the Islands of the South Pacific Ocean in all its pristine simplicity.

The finest example we possess in Great Britain is one that was dredged from the Thames about the year 1864. In the year 1914 this priceless specimen, which was unrecognised, was in imminent danger of

being crushed up to make mortar. Its rescue by Mr. Lawrence of the London Museum I have related elsewhere. It is really a magnificent specimen, and one of which we may be justly proud. It was made by scraping the bone with flint scrapers. The operation was quite successful. Another skull, discovered by Dr. W. H. Paine, of Stroud, in the year 1863, was found in a dolmen near Bisley, in Gloucestershire. This is only a partial trephination, the operation having been abandoned either on account of the death of the patient or an unwillingness on the part of the priest-doctor to proceed with it. Prehistoric trephination was exceedingly rare in Great Britain. In France it was very different. France is, by a long way, the leading country in Europe for the large number of specimens that have been discovered there in dolmens, caves, caverns, and grottoes. I have already referred to some of the French specimens when speaking about amulets, so I must rapidly pass on to other countries of Europe—Scandinavia (particularly Denmark and Sweden), Germany, Bohemia, Poland, Russia (especially the Caucasian region), Spain, Portugal, and Montenegro.

Crossing over the Mediterranean Sea we will now mention Africa. In Algeria, among the Kabyles, the custom of primitive trephination is of very ancient origin. It is practised to-day with specialised metal implements among the Arab Shamans. In Teneriffe von Luschan collected 210 Guanche skulls, ten of which had been trephined. He found others in which the outer table of the skull only had been scraped away. Prof. Elliot Smith has examined 15,000 skulls from ancient Egypt and Nubia, but tells me he has never found a trephined specimen. The Guanches are supposed to have migrated from Egypt, so one would not have been surprised to find specimens in this latter country.

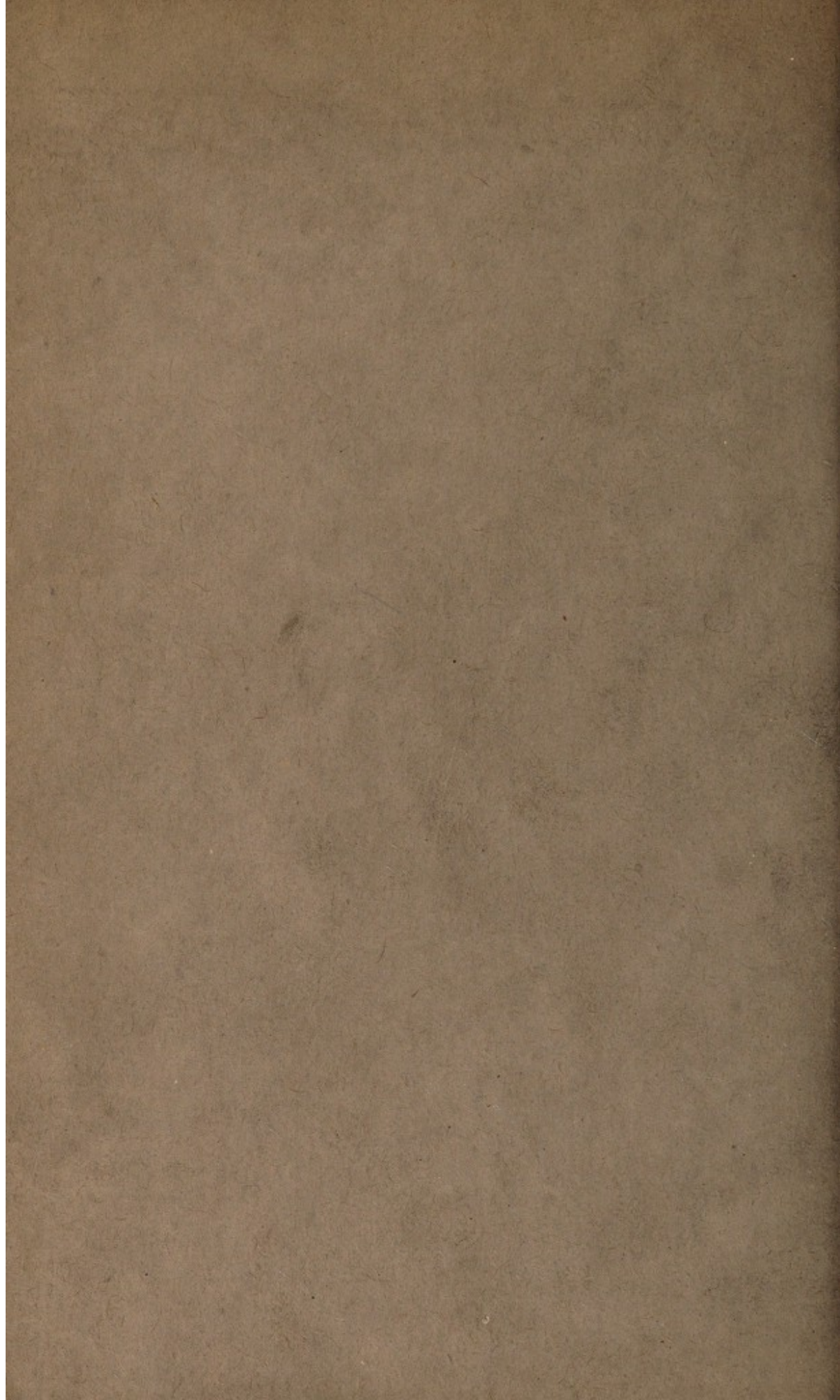
In Asia, Daghestan can exhibit primitive specimens and they have also been found in Japan ; but the vast area of Asia has hitherto been unexplored from this viewpoint and, no doubt, one day other specimens will be unearthed.

In North America no specimens of skulls operated upon during life have been found, though examples of posthumous ones have been discovered in

several of the States, notably Michigan, Illinois and Ohio. In Central America Lumholz found two skulls that had been primitively trephined, one during life and the other after death. It was among the ancient tribe of the Tarahumares. In South America many specimens have been excavated, notably in Peru, as have been already mentioned, and also some in Bolivia.

Australasia : I do not know that any specimens have been found in Australia itself, but the custom was prevalent, and even exists to-day, in Melanesia (New Britain and New Ireland), in the Loyalty Group (Uvea), and in the Society Group (Bora Bora), which latter is some 2500 miles east of the Loyalties. It is still practised in these islands of the South Pacific, sometimes for fractures of the skull produced by sling-stones and clubs, sometimes for epilepsy and other head disorders, and sometimes even to promote longevity, when a particularly handsome youth or beautiful girl is singled out as being an appropriate patient.





With compliments.

The Practice of Craniotrypsis as a
Mystic Rite in the Carnac Epoch
of the Neolithic Period

By

T. WILSON PARRY, M.A., M.D., Cantab., F.S.A.

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[1928]



The Practice of Craniotrypesis as a Mystic Rite in the Carnac Epoch of the Neolithic Period

By T. WILSON PARRY, M.A., M.D. Cantab., F.S.A.

I OFFER no excuse for introducing a new word into anthropology. This word has been wanted for long. Though a new word to British Anthropologists, for it cannot be found in any British Dictionary or Encyclopaedia, it is no new word, but merely an American importation. *Craniotrypesis*,* as its derivation shows, is a comprehensive word and will include *every* method of "opening the skull." Both the terms *trepanning*† and *trephining*‡ presuppose the use of specialised metal instruments and, when applied to the operation as performed by Neolithic Man, become both inaccurate and anachronistic, for the two good reasons that (α) the operation was done by scraping a hole in the bone by means of flint flakes, and (β) iron was not discovered till about two thousand years after this primitive proceeding had become a recognised ritual and firmly established as such.

It is not the purport of this paper to enumerate or dilate upon the different methods employed in carrying out this procedure,¹ nor to point out, the different regions of the world in which it was practised,² nor to enter into, the many and varied causes which gave origin to this curious custom.³ These matters have been dealt with elsewhere. It is my wish, at the present moment, to concentrate on *one* special period of time, *one* particular region of the world³ and *one* definite form of culture, in order to show that, in this individual instance, the operation in question was connected with religion and became a mystic rite of high ethical standing.⁴

The Neolithic Period, which has been computed to have lasted some 20,000 years, has been divided into three epochs, each of which stands for the culture that bears its name. How long these epochs lasted cannot, at the

* Craniotrypesis [κρανιον = head, τρύπησις = a holing]. This word is to be found in Dorland's American Illustrated Medical Dictionary, 1926. I am indebted to Mr. L. A. G. Malcolm, M.Sc., Cantab., F.R.S.E., Conservator of the Wellcome Historical Medical Museum, for bringing it to my notice.

† Trepanning [Greek, τρύπανον, an augur].

‡ Trephining [Latin, *Tres*, three and *finis*, ends. A terrible word concocted by Woodall (died 1643) when he gave the "trepan" a handle and evidently decided that the new word must bear some resemblance to the old one, though the one was Greek and the other Latin].

present time, be accurately ascertained, but it is probable that several thousand years can be allotted to each. They are, (1) The Campigny, (2) The Robenhausen, and (3) The Carnac Epochs.

It was in this third or Carnac Epoch of the Neolithic Period when craniotrypesis was first practised in Europe and a study of this time will give us some idea of the atmosphere in which Carnac Man lived. To best accomplish this, a visit should be paid, either in reality or imagination, to Carnac itself, as this centre in Brittany introduces one almost immediately into the life of the Neolithic Man of this period. Here in this land of Menhirs, Stone Avenues, Cromlechs and Dolmens his life can be easily and instinctively reconstructed. It is with something more than astonishment that one views, for the first time the long Avenues,* lined by upright stones (Menhirs), some of which are 12, 15, 17 and even 19 feet high. Here, indeed, is depicted industry on a colossal scale, for each one of these stones had to be brought to its place and erected into an upright position with nothing but levers and other crude implements at the workers' disposal. Here, too, immense and massive dolmens can be seen with their gigantic cap-stones weighing "teens" of tons.

These dolmens we recognise as sepulchres, for in the majority of them human remains, with accompanying relics of the period of interment, have been found. But were they always so? The tomb, in prehistoric days, was often a copy of the habitation, or even the very habitation itself, in which the deceased had lived when alive. Rock-shelters and caves were formerly the habitations and later the tombs of earlier man. No doubt some of these dolmens had been, at one time, the abodes of important chiefs, or priests or medicine-men, which had become converted into tombs, perchance, for these very men themselves. Might not the most massive of these impressive structures have themselves been sanctuaries of some kind? In one† I entered it seemed impossible not to associate it with worship. On the end-stone, which helped to support the enormous table-stone, which must have weighed between twenty and thirty tons, was a sculptured engraving of a distinctive character. In the centre was a representation of the sun with rays emanating in every direction. Surrounding this were corn-stalks with heavy ripening ears, waving in the wind. Outside a line, which followed the contour of the triangular head-stone, rounded at its summit, were short curved lines signifying rippling water. This surely illustrates the kindly influence of the warm sun ripening the corn, as well as the gift of water by beneficent Gods. In another‡ dolmen were chiselled two large eyes on the altar-stone and, on the upright, supporting menhirs were carved gruesome-looking serpents. This surely denoted the fear wrought by evil deities

* In three of these Avenues, namely, Le Champ du Ménéac, Le Champ du Kermario and Le Champ de Kerlescan there are no less than 2730 menhirs. *Les Monuments Megalithiques de Carnac et Locmariaker*. Par Z. le Rouzic.

† La Table des Marchands in Locmariaker, Morbihan, Brittany.

‡ Mané Lud, Locmariaker, Morbihan.

and may have been, at one time, a sanctuary erected for propitiating evil monsters capable of exercising harm upon possible delinquents. The whole atmosphere of this region breathes religion. Carnac Man was a thinker and meditated much on the future life.

Having shown what time, labour and devotion had been bestowed by this race on their religious faith it will now be less difficult to understand how the seed of a new rite falling upon such suitable soil would quickly take root and might develop into exceptional if not extravagant proportions.

We must now approach this investigation from an entirely different aspect. For this purpose I must introduce to your notice the subject of amulets of the human skull. In order to show the proper relationship that existed between these amulets and holed skulls, found together in interments, I cannot do better than give a brief history of their first findings. It was in the year 1865 that Dr. Prunières, a general medical practitioner of Marvejols in the department of La Lozère, France,⁵ while exploring a dolmen near Aiguères, came across a human skull out of which a large portion of bone, about as big as "a man's hand," had been artificially removed by cutting and sawing. A small edge of this gap looked as if it had been polished. Professor Broca, later, showed that this "polished" portion was nothing more nor less than the smooth, healed cicatrix of the bone, which had resulted from an operation performed by scraping a hole in the cranium during life. Prunières discovered, lying beside this mutilated skull, five fragments of cranial bones that had been deliberately cut or sawn with some special object in view. He thought, at first, that they were the missing fragments from the skull; but, on examination, the pieces would neither fit together nor would they refill the gap. In a word they were fragments that had been removed from some other skull or skulls, from some other dolmen or dolmens, brought there and placed beside this skull. It may be added that these fragments also had "polished" ends. Now what was the meaning of this? Broca tells us. It is well known that among primitive peoples there is an anxious desire on the part of the deceased's relations and friends not, in any way, to vex or annoy the dead man, or his spirit may return to earth to torment them. Now these amulets were very precious things. To show how much they were in request it may be mentioned that there were impostors in those as well as in these days, for a circular *rondelle* made from the skull of a deer and perforated for suspension was found in the sepulchral caverns of Baumes-Chaude.⁶ This had, no doubt, been palmed off as a genuine human amulet. But the amulet had to be got and, at the same time, the dead man's spirit must not be unduly ruffled;⁷ so, after taking what was required, a substitute was invariably inserted, but always more was taken than replaced, so gain was the net result. One skull that Prunières discovered in a dolmen in Lozère, with a very large gap in its side, was found to have been stuffed full of earth, and on abstracting the earth, which had been rammed

into it, with some degree of pressure, right in the centre he came across a round disc of human parietal bone. This was but a mean return for so large a piece taken, and it was easy to prove that it had never belonged to the skull in question, as the two bones differed in colour, density and thickness.

And now we may ask in what way is this holed skull connected with the spiritual life of Carnac Man? The answer may be unexpected. Epilepsy has been looked upon from time immemorial as an affection of the "spirit" and of mystic origin. The mysterious character of its fits placed the patient in the same category as gods or demons. The prehistoric thinker would imagine in his day precisely what the crowd around the epileptic did, centuries later, in the time of Christ. They believed they were looking upon a man who was verily "possessed with a devil." And can we wonder? The epileptic's cry at the commencement of an attack, his upturned eyes, his foaming mouth, the spasms and contortions of his muscles giving him the appearance of having almost super-human strength—all these present a picture of one who has some wild, restless, imprisoned spirit pent up in his cranium, struggling to be set at liberty. Is it difficult to see, under such circumstances, why the tribal Medicine Man should conceive the idea of "opening" his skull? If the race believed, as it undoubtedly did, in the "possession" of evil spirits, no more reasonable attitude towards such could have been adopted. Epileptics, like lunatics, were looked upon with reverence. They were not understood, and what was not understood was incomprehensible, and what was incomprehensible was either divine or the reverse. Whichever "spirit" it was, good or indifferent, its human habitat had to be venerated. If an epileptic had his skull "holed" and lived there is no doubt he came in for an almost idolatrous adulation.

Concerning the material that has come down to us from Carnac times it may be stated that Prunières himself is reported to have possessed 167 specimens in his own private collection, while over 60 specimens of holed skulls and amulets were discovered in the caverns of Baumes-Chaudes (La Lozère) alone, in the year 1878. Since then large numbers have been unearthed in different parts of France, by zealous antiquaries, and these have found their way into private collections and public museums in many parts of the country. Now it is quite impossible to believe that the many individuals represented by this mass of material, should have suffered from epilepsy and epilepsy alone. I feel there can be little doubt that this curious operative procedure was instituted as a rite for the casting out of devils and that a wide expansion was gradually effected for the riddance of many another, beside the epilepsy-demon. The medical mind will quickly grasp the kind of disorder or disease that would give the individual sufferer the idea that he was "possessed" by some kind of evil spirit. They would be, at first, disorders of a distressing nature that demanded some drastic treatment. Among this class may be enumerated persistent chronic headache, migraine, chronic neuralgia with acute exacerbations,

and alarming attacks of giddiness with or without singing in the ears and distracting noises in the head. With any of these exasperating disorders it will be agreed that it was not unlikely that the patient might feel that life, under such circumstances, was practically undesirable, and he would be almost eagerly willing to undergo any treatment of a *kill-or-cure* nature, so as either to obtain alleviation from his malady or permanent insensibility from it by death. I said that such disorders would *at first* suggest the idea of craniotrypesis; but I cannot believe that it would stop there. The Carnac Man that possessed an idealistic mind might feel that this rite was a definite means of cleansing himself of every kind of devil that flesh is heir to and, at the same time, win for himself spiritual purification. But there would be another and a far larger class of man to whom this exalted ethical state would make no appeal, but who would be actuated by other desires of a more human or mundane character. I have already said that we have reasons to believe that he who had passed through the ordeal of craniotrypesis and come out of it triumphantly was regarded with an almost jealous admiration by his kinsmen and the race in general. Self-glorification is a rooted idea in the mind of partially civilised man and it therefore logically follows that if such an one, with even but an average supply of vanity, foresaw a cheap and short way of "having greatness thrust upon him," would he not be foolish indeed did he not seize the golden opportunity? The operation of craniotrypesis gave him this chance. It must not be forgotten, too, that the more elemental the man, the less sensitive to pain is he than his more civilised brother.

To briefly summarise the foregoing. A rude surgical undertaking, threatening the life of the operatee, was carried out, as a religious rite, during the Carnac Epoch of the Neolithic Period which ended in north-western Europe about the year B.C. 2000. This rite was first instituted to permit the escape of the demon of epilepsy; but was, in my opinion, afterwards extended to allow for the casting out of other devils of a kindred nature. It may further have been employed as a ritualistic sign of spiritual purification. This practice, having been upheld at a high spiritual standard for a considerable period, appears to have gradually degenerated from a fetish into a mere fashion. From the large number of holed skulls of that period that have been preserved to the present day, in spite of five or six thousand years of damp climate, calculated to accelerate decomposition, it is more than likely that these specimens, numerous though they may be, are nothing but a fractional proportion of the vast number that originally existed. Analogous to some of the fashionable excuses that may have been put forward in those days, when it had ceased to be a religious and had become a mere decadent or profane art, is the fact that, in quite recent years, in some islands of the South Pacific Ocean, handsome youths and beautiful girls were persuaded to have a hole scraped through their crania in order to promote longevity!

To show how the religion and superstition of one epoch may strangely affect that of another, thousands of years later, it is only necessary for one to go to Brittany and observe the number of menhirs that have been converted into "Christian" shrines, by simply having crosses carved thereon, or by the additional embellishment of madonnas and babes. There is no doubt that the Breton priest regards these stones as pagan idols of a kind and would be only too pleased to "Christianise" as many as possible. He is unable to visualise a scene of distant ages back. A long procession of Carnac men reverently wending their way down one of those stately Avenues to the place enclosed by the Cromlech at the end of the Avenue, where the rite, the sacred operation for the casting out of the tormenting spirit, would probably be performed by the officiating priest-doctor. The crowd, hushed and awe-stricken, follow with their eyes that procession, with spell-bound fascination. It must have been a most imposing ritual and even more sacred to their race, it being sacrificial in character, than the administration of high mass by the present-day Breton priest to his congregation.

But the contrast between the religion of the dim past and that of to-day can be even further continued.

In the Cathedral of Avranches can be seen a glass-sided reliquary and in that reliquary is a human skull. You will be told that this skull belonged to Saint Aubert who became Bishop of Avranches in the year 708, founded the well-known church on Mont St. Michel and died in 725. You will note that this skull has a singular hole in it, this hole possesses a smooth shelving edge and you will be told it was made by the fore-finger of the Archangel Michel.

That hole was not made by any Archangel, nor even by an angel, but by a man and that man a priest-doctor of the Carnac Epoch. It is not difficult to visualise the discovery of that skull in one of the numerous dolmens that abound in that neighbourhood and the excited wonder it must have created when its discovery was made known, which could not have been earlier than the eighth century. We next visualise its removal to the Cathedral as a miraculous curiosity and, later still, we can be present, in imagination, at the ceremony of inauguration when the skull was openly proclaimed to be that of the great Bishop of Avranches who erected a wonderful church on the top of Mont St. Michel. How things come to pass! But the Bishop died in the eighth century and the skull belonged to a Carnac Man who lived some three thousand years earlier!

The kindly Breton priest tries his best to "Christianise" what he considers "pagan," all the time, unconsciously, oblivious of the fact that he is "paganising" what he is pleased to regard as Christianity.

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- (b) Skull found by M. Gaillard in one of the dolmens of Port-Blanc at Saint-Pierre de Quiberon (Morbihan), also described by Professor Parrot. Scraping on one side of hole (2½ in. x 2 in.); but an abrupt edge on other. Probably a wound at first instance in which suppuration had taken place and operation performed to relieve pressure on brain due to pus. *Dictionnaire des Sciences Anthropologiques*, p. 1073.
- ⁵Sur la Trépanation du Crane et les Amulettes Craniennes à l'Epoque Néolithique. Par Prof. Paul Broca, pp. 69, 70.
- ⁶*Bull. de la Soc. d'Anthrop.*, p. 206, 1876.
- ⁷See paper read by Prunieres at a Meeting of the French Association for the Advancement of Science, held in August, 1873, at Lyon.

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NEOLITHIC MAN AND THE PENETRATION OF THE LIVING HUMAN SKULL

*A Lecture delivered before the Cambridge University
Anthropological Society on Nov. 18th*

BY

T. WILSON PARRY, M.A., M.D., F.S.A.

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B. III

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NEOLITHIC MAN AND THE PENETRATION OF THE LIVING HUMAN SKULL.

[Dr. Parry said that he would relate briefly the results obtained by a series of experiments undertaken on skulls (recent and dry) for the purpose of discovering the methods employed by Neolithic man, when operating upon the living human being, with implements fashioned out of the most primitive materials. In connexion with the nomenclature of operations performed in the late Neolithic period, he said that the words "trephining" or "trephination" "trepanning" or "trepanation," were used wholly oblivious of the fact that these terms imply that the operation of making a hole in the skull was performed by a metal instrument, a "trephine" or a "trepan," as the case might be, whereas in Neolithic times this operation was carried out many centuries before iron was discovered. He thought that a distinctive name should be employed so that the reader would understand readily when the primitive operation was under discussion. The word "cranio-trypsis," being the Greek equivalent for simply making a hole in the cranium without specifying by what manner, has been coined in America, but the lecturer had come to prefer the word "holing" as being the simplest, clearest, and best English representation of this elemental procedure.

Dr. Parry then showed slides illustrating "some of the creations and customs of late Neolithic man, in order to catch a breath of the atmosphere of his culture and life." The slides represented (1) exquisitely worked arrow-heads, most of them finely barbed; (2) a flint dagger, two beautifully made saws, a sickle, and a chisel; (3) a finely shaped round-bottomed bowl, dredged from the Thames at Hedsor, 7 in. wide by 5 in. high, twisted sinew markings; (4), (5), (6) stone avenues at Carnac in Brittany, nearer view, and close up; (7), (8) Stonehenge (reconstructed), and as it is now; (9) burial in a long barrow (reconstructed); (10) a two-chambered tumulus (Denmark); (11) interior of a long barrow (W. Kennet, Avebury); (12) Trevelth Cromlech (near Liskeard, Cornwall); (13) Dolmen des Marchands, Lockmariaquer, Carnac; (14) section and plan of Dolmen des Marchands; (15) end-stone of the same dolmen.

He continued :]

Reasons for the Primitive Operations.

Why did Neolithic man, even when surgery was in such a primitive condition, feel compelled to attempt so momentous an operation? One can tell by the study of a series of specimens of Neolithic man's handiwork that the operator did not approach

his work in a light-hearted manner, but that he fully appreciated the importance and, I may say, the seriousness of his undertaking. It was not so much the case of surgery having risen to a supreme height which stimulated such a proceeding, but the urging necessity of an all-important religious rite that dominated the position.

When showing you the stone avenues, circles, and dolmens of the Carnac region of Brittany, I must have impressed you with the atmosphere of religious life that pervaded this great centre, and this operation was initiated and developed as a religious rite for ridding an affected individual of some demon or demons that were supposed to have taken "possession" of him.

The disease, or I ought to call it the "disorder" of epilepsy was, I am convinced, the first indication, to members of a tribe, of any special individual being possessed of a devil. For those who have never seen anyone in an epileptic fit, I cannot do better than refer to the description of one which I have no doubt is familiar, as it appears in the New Testament.

"And one of the multitude answered and said, 'Master, I have brought unto thee my son, which hath a dumb spirit and wheresoever he taketh him, he teareth him; and he foameth and gnasheth his teeth and pineth away.' And they brought the boy to Him and when he saw him straightway the spirit tore him and he fell on the ground and wallowed foaming.

"And Christ asked his father 'How long is it ago since this came under him?' And he said, 'Of a child and oftentimes it hath cast him into the fire and into the waters to destroy him.'

"When Jesus saw that the people came running together, He rebuked the foul spirit and the spirit cried and rent him sore and came out of him and he was as one dead, insomuch that many said 'He is dead.' But Jesus took him by the hand and lifted him up and he arose."

To those who have witnessed an epileptic fit, this dramatic description, recorded nearly 2000 years ago, will bring before the mind, vividly and realistically, a picture of this condition. First comes the "epileptic cry," followed by contortions of the face, rolling of the eyes, and foaming of the mouth, with convulsions of the limbs. It is not unreasonable to think that a paroxysm of such a nature might have given anyone, in those days, the idea that an evil spirit was in the cranium of the victim and was clamouring vainly to free itself from its imprisonment. What should be done in such a case? The answer comes almost spontaneously—"Make a hole in the skull of the afflicted one and set the demon at liberty." Could anything be more logical to anyone holding such opinions?

Such large numbers of "holed" skulls of the ritualistic type have been unearthed in different parts of France that it is quite impossible to believe that the many individuals represented by this mass of material should have suffered from epilepsy and epilepsy alone. I feel there can be little doubt that this unique operative procedure, begun as it was for the dispelling of the epilepsy-demon, became instituted as a rite for the casting out of other devils. The next class of demons to be tackled would be represented, as we medicals would say, by such

disorders that gave "head-symptoms," such as persistent chronic headache, migraine, chronic neuralgia with acute exacerbations, alarming attacks of giddiness, with or without singing in the ears, and distracting noises of the head. With any of these exasperating disorders, from the patient's viewpoint, it is reasonable to think that he would be only too willing to submit himself to a kill-or-cure treatment, to obtain alleviation from his malady, or permanent insensibility from it by death. I cannot believe that this spiritual treatment would stop even there, but that this rite would have been eventually extended for the extirpation of all devils that "flesh is heir to." The Carnac man that possessed a mind superior to his fellows might feel that this rite was a definite means of cleansing himself from every kind of devil, at the same time winning for himself spiritual purification.

Mention must just be made of amulets of the human skull which have been frequently found in relationship with "holed" skulls in dolmens in different parts of France. Prunières, a general medical practitioner, of Marvejols, in the department of La Lozère, France, was the first to draw attention to this association, and Broca was the first to offer a reasoned explanation of this relationship. It appears that when a man died whose skull had been perforated for ritualistic reasons, his tomb was entered and pieces of his skull, each containing a portion of the healed operation ring of bone, were sawn off with a flint saw, and these were regarded as most sacred relics. Some of these were grooved, and some were holed for suspensory reasons, so that they could be worn round the neck of their owner. Up to about $\frac{4}{5}$ of the cicatrised bone circle was sometimes removed in portions, and these portions were taken, but there was always at least $\frac{1}{5}$ part left on the skull. The removed portions were replaced by other bits of skulls from other tombs, fewer always than those taken, and sometimes sawn pieces not even containing any evidence of an operation having been performed at all. This was done so that the spirit of the robbed corpse might not feel disgruntled and take revenge by haunting those that had deprived him of his lawful glorification.

Technique of the Primitive Operations.

By a series of nearly 50 experiments on the human skull I have been enabled to gain some practical experience of the methods adopted by men of the later period of stone-culture for "opening the skull" with primitive implements. I have been able to make out four distinct methods employed by primitive operators for this proceeding. I propose giving some details of each of these methods, illustrating each by examples of Neolithic skulls that have been treated in the manner I describe.

(1) *Scraping the Bone.*—The first, the simplest and by far the most common method, was by scraping

a hole in the skull with a sharp-pointed flake of flint. Where flint was not indigenous, as in volcanic regions, flakes of obsidian or rhyolite glass were substituted. I may here add that in the South Pacific Islands shell used to be used at times, and after the white man's visit to some of these islands where he introduced glass bottles, bits of glass were chipped into shape, and these made excellent implements for scraping purposes. Whichever of these four materials be employed, they are all used precisely in the same way. The flint or obsidian flake is held between the thumb and index-finger of the right hand, and scratches are made in a single line on the chosen site of the operation. These scratches quickly fashion a groove, and the sides of the groove have next to be attacked, when this single furrow becomes converted into a basin-like ellipse. This is deepened and widened till the diploe is disclosed, and further deepened till the inner table of the skull is reached. The point of the flint-flake is now used as a probe to test the depth of the vitreous or inner table. The primitive surgeon is able to tell when this is reached by a peculiar crackling of this glass-like layer which warns him that he must proceed cautiously, so as not to injure the dura mater. The primitive operator became eminently skilful by his careful procedure, as is evidenced by the very large number of skulls discovered which show perfect holes and healthy healing of the bone, verifying a successful operation. This method was found to be suitable for the making of small holes in the skull, and these are usually found to be either circular or oval in shape. An example of this method is illustrated by the "Thames" specimen dredged from this river at a spot just above where Hammersmith Bridge now stands. Here are two examples from France. I show you one successful case and another one clearly demonstrating a septic periosteitis, which appears, however, to have eventually recovered. I show you specimens from the South Pacific Islands—the holes of which were scraped with obsidian flakes; also one from Egypt (Dynastic period) which exhibits a depressed fracture which has been treated by sawing away the depressed portion and trimming the edges by scraping with a flint flake. The Egyptians for long after the pre-dynastic period would not suffer metal to touch either a living or a dead body—indeed, they used to employ stone knives and flint saws in the process of embalming. I also show you specimens of Inca origin. One has three openings, and another shows evidence of five well-formed holes which I think may be regarded as a champion specimen that has beaten every other record in this respect.

(2) *The "Push-plough" method.*—For the making of larger and sometimes even gigantic holes in the living skull, I am convinced that the scraping method could never have been employed. It would be too tedious for the operator (as well as for the operatee), and much too dangerous. It has been a subject of considerable question as to how these very large

openings were made. Two methods could have been employed. The first of these methods I believe to have been the following. An unfinished operation on a skull discovered at Peniche in Portugal gave me a clue as to what might have been done. You will see at a glance that this rather large elliptical incision was probably done by running the sharp point of a flint implement in a forward direction, away from the operator. Ploughing the land is usually done by horses or oxen pulling the plough to cut a groove in the soil; this would be done by pushing the implement in a forward direction to cut a furrow in the bone. For this reason I have given the name of "push-plough" to this method. Scratches would first be made on the path to be furrowed, and then the pushing forward of the sharp-pointed flint implement would wear away the outer table of the skull on the lines previously indicated. I show you slides of three stages in this operation. The first makes the lines of incision through the outer table; the second through the *dipl e* up to the internal table, and the third shows the removal of the large rondel of the bone to produce an opening similar to those found in dolmens in different parts of France. I show you an English, a French, and a prehistoric Peruvian (Inca) skull which I believe have been treated in this way.

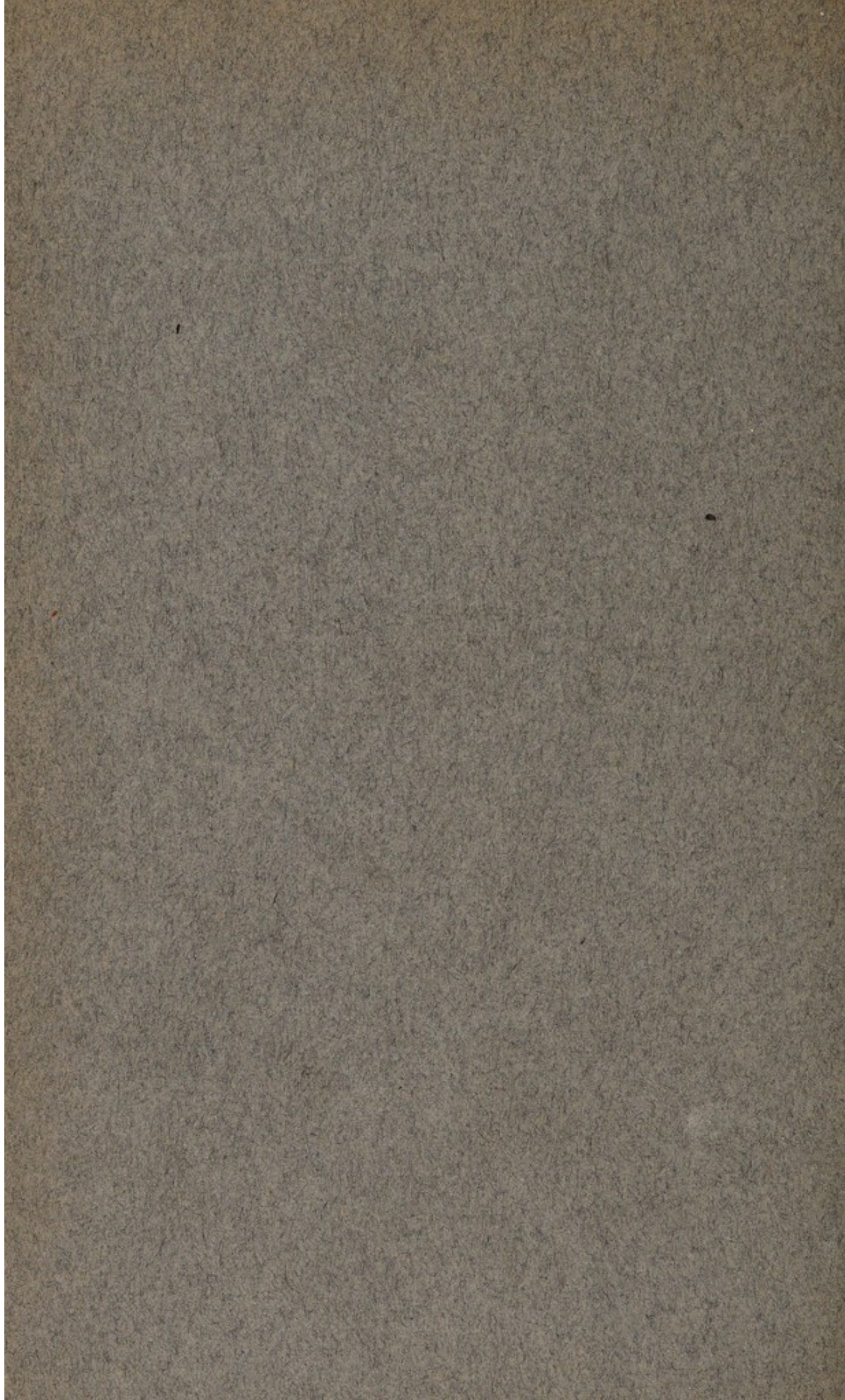
(3) *Boring and Sawing the Bone.*—Another method of removing either large or smaller portions of the skull was brought about by the double action of boring and sawing the bone. Holes were bored in a circle, closely packed together, and the partitions between the holes were sawn or rasped through, so as to form eventually a ring of incision and permit subsequent removal of a rondel of bone. This could have been done either by hafted hand-borers or by mechanical borers. Hand boring holes in a bone is a most tedious thing, and I cannot believe this was often or even ever employed. A mechanical borer consisting of a flint-point, hafted into a wooden shaft, was most probably used. This implement, the bow-drill, is one of the oldest kinds of mechanical contrivances, and it has been suggested that it was used before bows and arrows were invented, and, indeed, it was it that gave man the idea of shooting arrows from a bow. I will show you an Inca skull that has been operated upon by this means. Another method of boring was employed in the South Pacific Islands when a shark's tooth, hafted into a shaft, was used. A shark's tooth makes an ideal "trephine," as the edges on the tooth are serrated, are very strong, and they have a flange which prevents the tooth from penetrating too deeply into the bone to the damage of the *dura mater*. Holes would be bored in a circle, as with the flint-pointed bow-drill, the partitions between the holes being sawn through either by means of an obsidian flake or with the serrated edge of the shark's tooth itself, and the rondel could then be easily removed.

Surgery of the Incas.

(4) *Sawing the Bone*.—The fourth and last method employed by primitive surgeons for removing a portion of bone was employed, as far as I can tell, only by the Inca races in prehistoric Peru. It must be remembered that the age of stone-culture in Peru did not end till very late. It was in the year A.D. 1532 that Pizarro, a Spanish adventurer, with a small band of Spaniards, treacherously conquered the Incas, by pretending to be friends, and then turning upon them and murdering them with their guns; the Incas not having seen such weapons before were paralysed into submission. The only metals known to this nation at that time were gold and silver which were, of course, useless for implements of any importance. The Incas were great surgeons, and with stone implements did all their surgical operations on the human skull, as regards fractures, with astonishing daring. They operated also for disorders of the head, for such cases as gave "head symptoms," as probably continuous headache, giddiness, epilepsy, and kindred disorders, but there is no proof they ever operated, as in Neolithic France, for ritualistic reasons. Not a single human amulet has ever been discovered in Peru, and this is strong evidence that they did not believe in the extirpation of evil spirits in this way. Indeed, the religion of the ancient Peruvians was far in advance of this. They believed "in a Great Spirit, the Creator of the Universe, who being a spirit could not be represented by any image or symbol, nor be made to dwell in a temple made with hands. They also believed in the existence of the soul hereafter, and in the resurrection of the body." They regarded the body after death as a sacred thing, and would not permit mutilation of any part of it; hence the reason no human amulet has ever been found. Hence the great difference between them and the men of Neolithic France—their motives for this operation being absolutely and widely different.

The operation to which I refer was one of pure sawing. With stone saws they made a figure on the cranium resembling that made by a diagram resorted to when playing the game of "naughts and crosses." This removed a square button of bone, but was a most dangerous operation, not a single instance has come down to us of recovery. Indeed, the Squier "Inca" skull was the first example of the kind that was brought over to Europe and created much wonder wherever it was shown. Both Nélaton and Broca examined it and concluded that the patient had only survived the operation from 7 to 15 days, as the degree of reparation of the bone was small and the man must have died within this specified time. Squier brought the skull to Europe in the year 1867, so that it is yet barely 65 years since it was recognised that cranial surgery was attempted, from whatever motive, by man in his state of stone-culture.



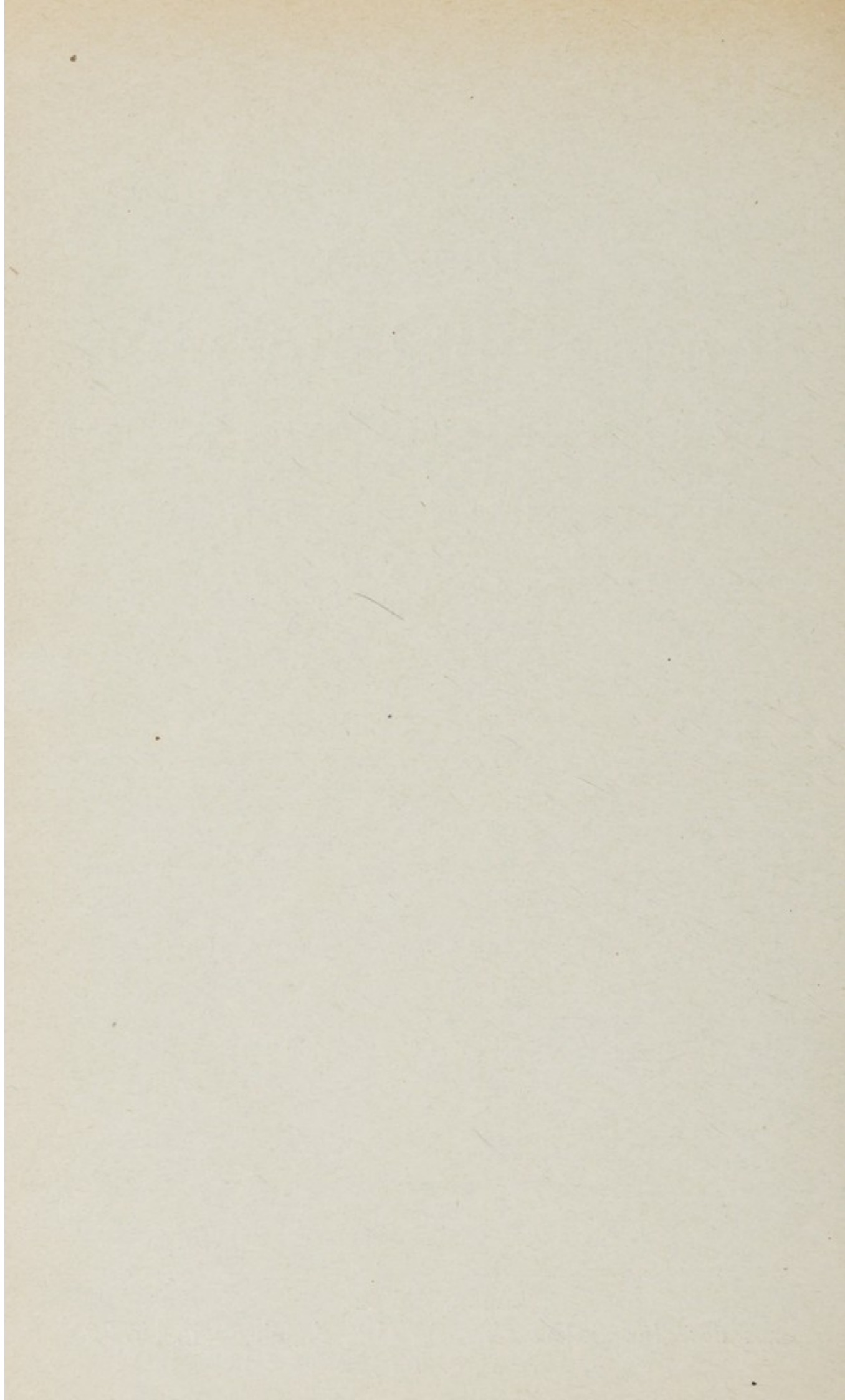


Vett T. Wilson Parry's kind regards.

Über die
**Schädelhöhlenöffnung
am lebenden Menschen**
in der prähistorischen Zeit

T. WILSON PARRY, M.D. F.S.A., LONDON

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In dem Wellcome Historical Medical Museum findet sich eine von Dr. *Wellcome* mit Begeisterung und Freigebigkeit zusammengebrachte Sammlung von Schädeln mit Trepanationsöffnungen, die von den neolithischen¹⁾ Menschen an ihren Mitmenschen — sehr oft mit Erfolg — ausgeführt wurden.

Die Sammlung zerfällt in drei Gruppen:

- A. Abgüsse und Photographien von Schädelöffnungen, die entweder am lebenden Menschen oder nach dem Tode vorgenommen wurden.
- B. Schädel von heutigen Naturvölkern, an denen sich dieselbe Operation nachweisen läßt.
- C. Eine Reihe von Versuchen an frischen und trockenen Schädeln unserer Zeit, die vollkommen mit primitiven Werkzeugen von neolithischem Typ ausgeführt wurden.

Zunächst möchte ich die Gründe darlegen, die für die neolithischen Menschen die Veranlassung waren, das Leben eines Mitmenschen durch den Versuch einer Operation, die sogar heutzutage viel Sorgfalt und Geschicklichkeit erfordert, aufs Spiel zu setzen. In der neolithischen Zeit waren Priester und Mediziner in einer Person vereint. Man glaubte, daß Krankheiten von Dämonen hervorgerufen würden, und es war die Pflicht dieser Person, von der man meinte, daß sie über magische Kräfte verfügte, diese bösen Geister auszutreiben. Wohl bei keiner Krankheit oder funktionellen Störung des Menschen schien es sich so offensichtlich um eine „Teufelsbesessenheit“ zu handeln, wie bei der Epilepsie. Bekanntlich wird der Anfall oft durch einen unheimlichen

Nach einem Vortrag, gehalten am 12. März 1931 im Wellcome Historical Medical Museum vor der Cambridge University Medical Society.

¹⁾ Neolithisch = aus dem Zeitalter d. geblätteten Steinwerkzeuge.

Schrei eingeleitet. Es folgen dann die konvulsivischen Zuckungen des Gesichts und die Zuckungen der Gliedmaßen, die den Anschein erwecken, als ob der Kranke mit einem bösen Geist ringt. Der Schaum vor dem Mund vervollständigt das Bild eines Sterblichen, der vergeblich mit einem unsichtbaren bösen Wesen zu kämpfen versucht. Diesen Epilepsie-Teufel mußte man loswerden. Da er im Kopf zu

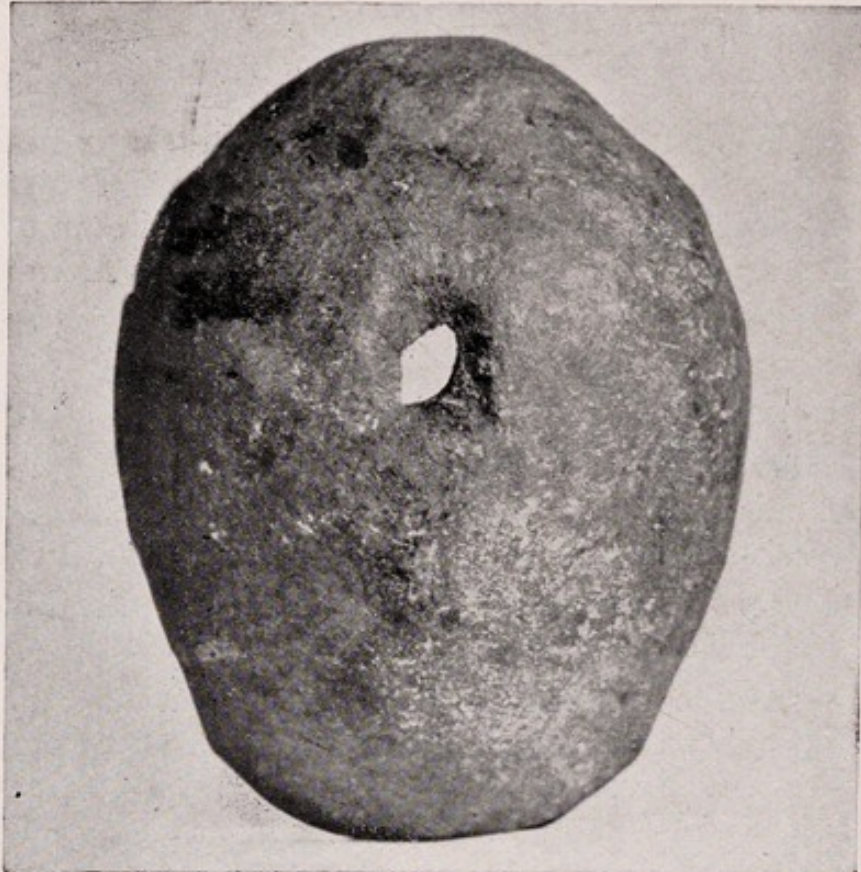


Abb. 1. Der prähistorische Themse-Schädel

stecken schien, konnte es kein einfacheres Verfahren geben, als ein Loch durch das Schädelbein zu bohren und ihn aus seiner Gefangenschaft zu befreien. Aber es gab auch noch andere Dämonen außer dem Epilepsie-Teufel. So z. B. waren alle diejenigen von bösen Geistern besessen, die an hartnäckigen Kopfschmerzen mit schweren Fieberattacken, an heftigen und plötzlichen Schwindelanfällen und ähnlichen Krankheiten litten. Es gab auch noch andere Krankheitsdämonen außer denen, deren Symptome sich am Kopf zeigten. Die Mantira, ein niederer malaiischer Volksstamm, glaubten, daß für jede Krankheit ein besonderer Dämon vorhanden war (das ist unserer heutigen Keim-Theorie nicht unähnlich). So z. B. einer für die Blattern, einer für Entzündungen an Händen und

Füßen, und einer für den Blutsturz. Kurz, jede Krankheit war unauflöslich an einen Dämon gebunden, der entweder ausgetrieben oder versöhnt werden mußte.

Schädelöffnungen am toten Menschen wurden wohl vorgenommen, um Amulette zu erhalten, die ein prophylaktisches Zaubermittel gegen die Krankheit, an der der Tote gelitten hatte, bilden sollten.



Abb. 2. Das Bisley-Exemplar

Der prähistorische durchlöchernte „Themse“-Schädel ist das schönste Beispiel prähistorischer Chirurgie, das Großbritannien überhaupt besitzt. Er wurde um 1864 aus der Themse gerade an der Stelle, wo sich jetzt die Hammersmith-Brücke befindet, gefischt. Ungefähr 100 Schädel wurden an diesem Ort zutage gefördert. Zu verschiedenen Zeiten wurden dort Gegenstände aus Stein, Bronze und Früheisen ausgegraben, die darauf schließen lassen, daß die Pfahlbautenbewohner, von denen untrügliche Spuren vorhanden waren, hier während der Stein-, Bronze- und Früheisenzeit gelebt haben. Dieser Schädel kann daher auch weder aus einer früheren als der neolithischen noch aus einer späteren als der Früheisenzeit stammen. Mit anderen kam er in die berühmte *Layton-*

Sammlung der Brentford-Bibliothek, und, nachdem eine Auswahl der wertvollsten Stücke getroffen worden war, wurde der Rest 1914 verkauft. Der Inspektor der Ausgrabungen am Londoner Museum kam zu dem Kauf zu spät, aber er fand heraus, daß ein Haufen Schädel unverkauft beiseite gebracht worden war, um als Mörtel zerstampft zu werden. Man



Abb. 3. Der Eastry-Schädel

hielt sie für Abfall des *Laytonschen* „Schutthaufens“. Sie wurden gesichtet, und unter ihnen entdeckte man dieses auserlesene und unschätzbare Denkmal prähistorischer Geschicklichkeit und Handwerkskunst. (Abb. 1.)

Ein Abguß des „Bisley“-Schädels (Abb. 2), den man im Herbst 1863 in einem großen Grabhügel in der Nähe von Bisley in Gloucestershire fand. Er zeigt eine unvollendete Operation, da der Patient entweder starb, bevor der Chirurg seine Operation beendet hatte, oder aber der Chirurg hatte von sich aus — aus einem Gefühl der Unsicherheit heraus — die Operation in diesem Stadium aufgegeben.

Eine Photographie des Eastray-Schädels (Abb. 3), an dem zwei Löcher in den Seitenwänden zu sehen sind. Ich führe auch diesen Schädel an, weil der verstorbene Dr. *Munro*, langjähriger Sekretär der Society of Antiquaries of Scotland, ihn als das

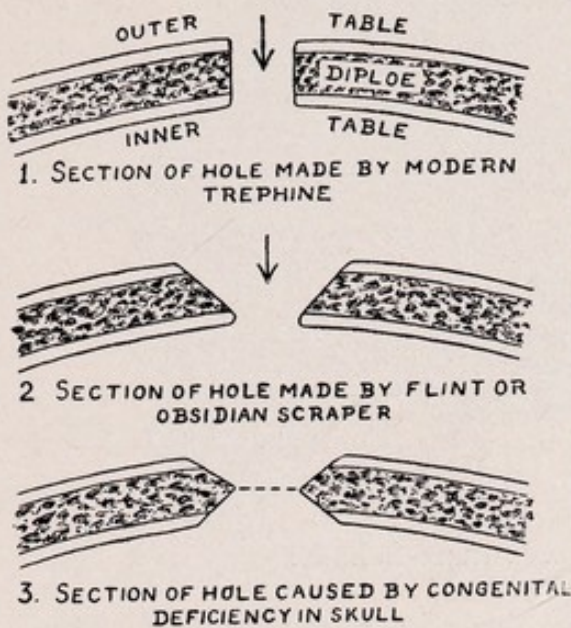


Abb. 4. Querschnitt der Höhlung

1. mit mod. Trepanation gemacht;
2. mit einem Feuerstein oder einem Stück Lavaglas gemacht;
3. durch angeborene Unausgebildetheit des Schädels hervorgerufen.

einzigste Exemplar ansah, das doppelseitige prähistorische Trepanationen aufweist. Dieser Schädel zeigt weder eine Trepanation, noch ist er prähistorisch; vielmehr ist er ein gutes Beispiel für eine doppelseitige angeborene Unausgebildetheit der Scheitelwände und kann leicht von der Trepanation durch die Art der Löcher unterschieden werden. (Siehe nebensteh. Skizze.) (Abb. 4.)

Die Photographie einer Zeichnung des Mount Stuart - (Bute) - Exemplars (Abb. 5). Dieser Schädel wurde in einer Kiste in Mount Stuart auf der Insel Bute zusammen mit einer acht Inches hohen Urne (oder Eßgefäß) aus der Bronzezeit, einer Jetthalskette und einem „kleinen Stück dünner Bronze von unbestimmtem Charakter“ gefunden. Der Schädel gehörte einer jungen Frau, die noch nicht einmal ihre Weisheitszähne bekommen hatte. Dr. *Rob. Munro* hielt ihn für ein Beispiel reiner Trepanation, nach welcher sich um den Rand der Öffnung eine Knochenhautwulst gebildet hatte. Dr. *Thomas H. Bryce* hingegen kam zu dem Schluß, daß das Loch von rein pathologischem Charakter sei. Ich glaube, daß die Wahrheit zwischen diesen beiden Annahmen liegt und daß eine teilweise Nekrose des Knochens entweder durch Zufall oder durch Krankheit stattgefunden hat. Das ausgekratzte Aussehen der Höhle läßt darauf schließen, daß der nekrotische Teil mit Hilfe eines Steinwerkzeuges entfernt worden war. Wenn das der Fall war, so muß der Patient kurz nach der Operation gestorben sein, da nichts auf eine Wiederherstellung schließen läßt. Die offenen Poren der Diploe sind nämlich sichtbar und der ganze Zustand läßt auf eine Sepsis schließen.

Das „Edinburgh“-Exemplar (Abbild. 6) ist ein schönes Beispiel für eine Schädelhöhlenöffnung am lebenden Men-

schen. Der Patient erholte sich danach gut, da die Ränder der Öffnung gut verheilt sind. Scheinbar war da eine sep-

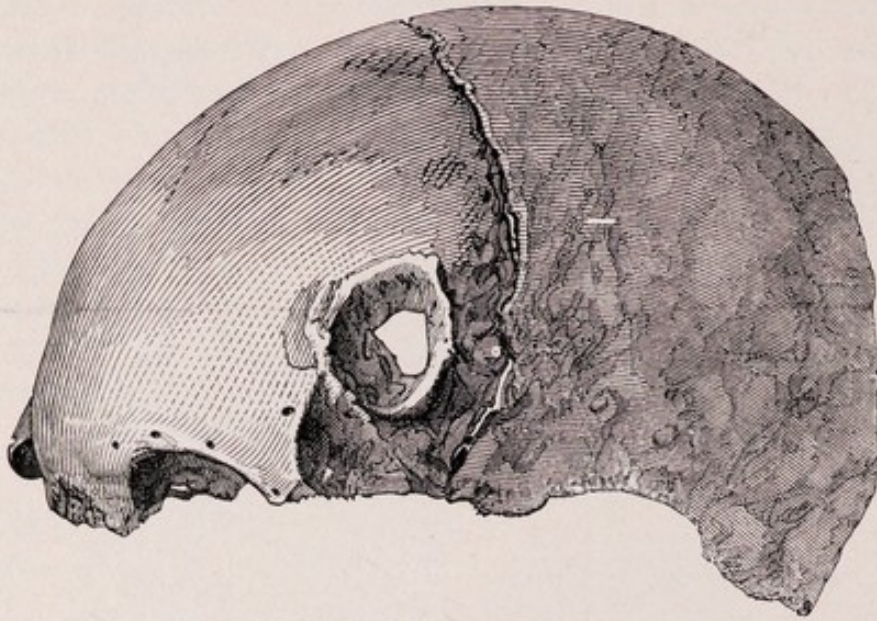


Abb. 5. Der Mount-Stuart-Schädel

tische Knochenhautentzündung eines beträchtlichen Gebietes um das Foramen herum vorhanden. Die Spur dieses Schädels kann bis auf 60 Jahre zurück, bis zum Museum des United Free College, Edinburgh, verfolgt werden.

Die Photographie eines französischen neolithischen Schädels, der zwei besonders große Löcher zeigt, die wahrscheinlich mit der „Pflug - („Push-Plough“) - Methode“ ausgeführt wurden. (Abb. 7.)

Die Photographie eines Schädels, der in der Grotte von Casa da Moura in Peniche in Portugal entdeckt wurde und der jetzt in der Geologischen Abteilung des Museums in Lissabon ausgestellt ist. Dieser zeigt eine unvollendete Operation und durch ihn bin ich auf den Gedanken gekommen, daß es eine



Abb. 6. Das Edinburgh-Exemplar

Art der Schädelöffnung gegeben hat, die ich die „Push-Plough-Methode“ genannt habe (Abb. 8).

Photographien, die die drei Phasen darstellen:

- a) Es wurde ein einfaches spitzes Feuersteinwerkzeug gebraucht und die „Furche“ im Schädel dadurch zustande gebracht, daß man die Spitze wie beim Pflügen vorwärtsbewegte (Abb. 9).
- b) Die Furche wird vertieft und erweitert durch die zersägende Bewegung eines stärkeren Werkzeuges, bis die tabula interna erreicht ist. Ein knackendes Geräusch zeigt, wenn die tabula vitria dem Druck des Werkzeuges nachgibt, warnend an, daß die dura mater in gefährlicher Nähe ist (Abb. 10).
- c) Wenn die tabula interna erreicht war, wurde mit einem Steinwerkzeug das ganze Knochenstück herausgehoben. Der dadurch entstandene Rand gleicht dem der großen Löcher am französischen neolithischen Schädel (Abb. 11).

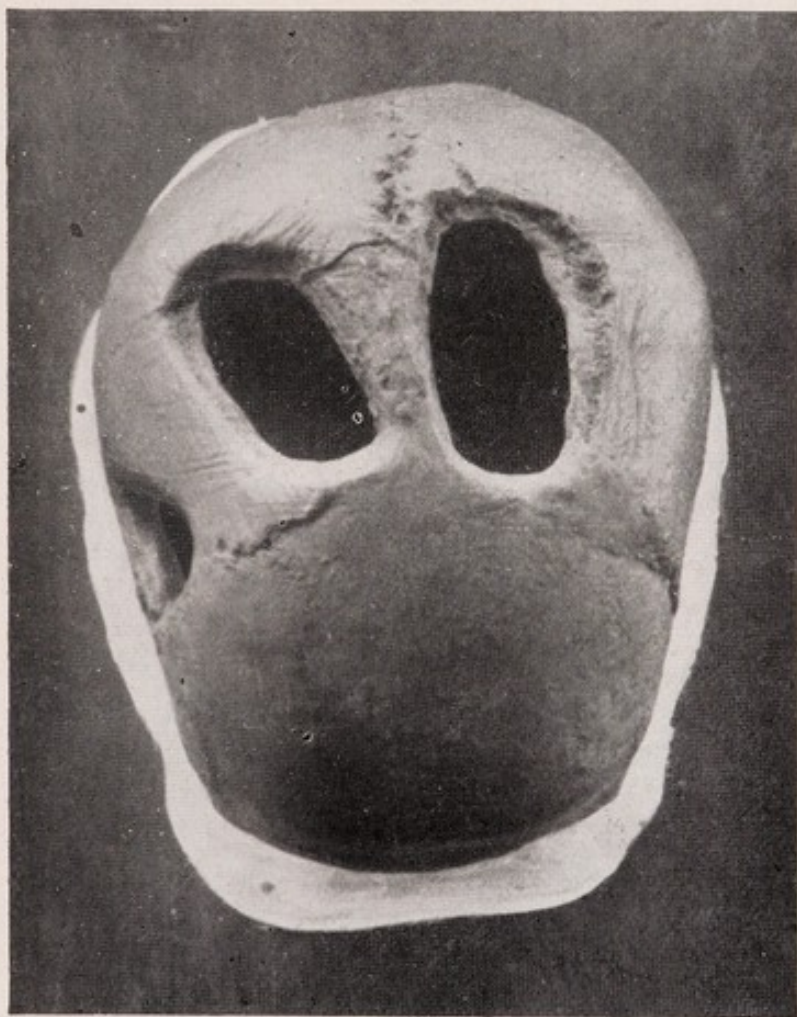


Abb. 7. Der französische neolithische Schädel

Die nächste Photographie (Abbild. 12) ist nicht nur von außerordentlichem historischen Interesse, sondern von Interesse überhaupt. Es ist das erste Exemplar, das von Peru nach Europa kam. Die Inkas, oder die Ureinwohner von Peru, waren geschickte und waghalsige primitive Chirurgen. Der Schädel wurde auf einem Inka-Friedhof

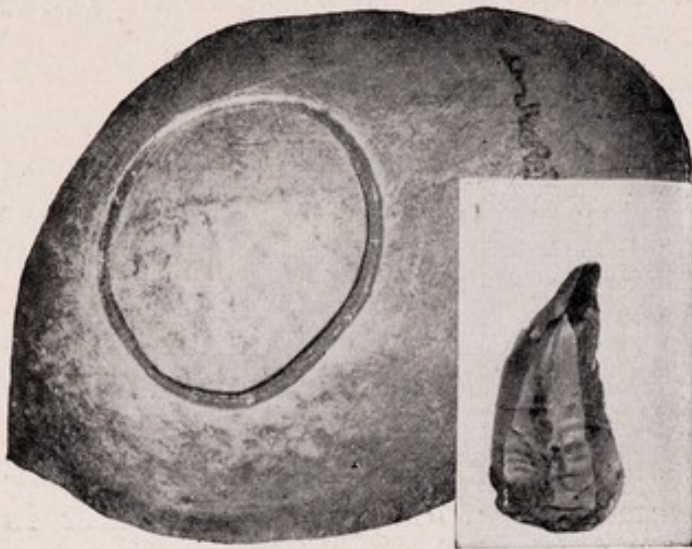


Abb. 9. Die „Schabe-Methode“ (Push-Plough) 1. Phase

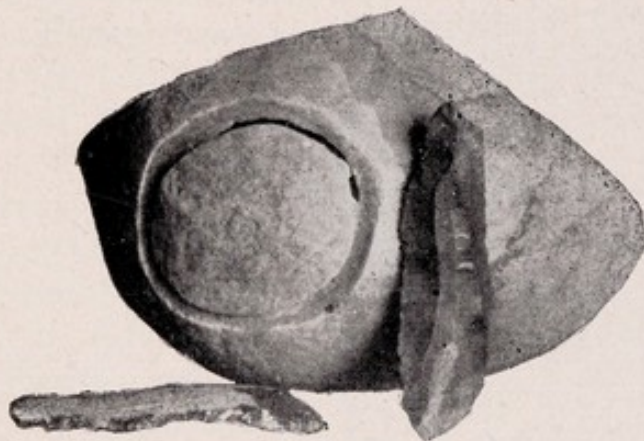


Abb. 10. 2. Phase

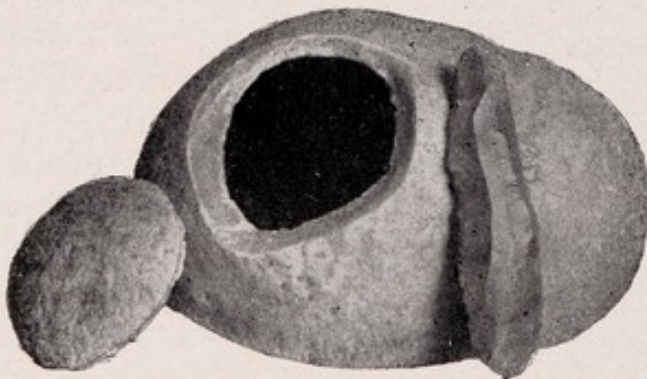


Abb. 11. Letzte Phase

im Yucaytal in Peru gefunden. Er wurde im Jahre 1867 beschrieben, d. h. 6 oder 7 Jahre vor den französischen Ausgrabungen. Er rief eine große Sensation in wissenschaftlichen Kreisen hervor, denn vor dieser Zeit, d. h. vor 65 Jahren, hatten die Anthropologen noch nicht einmal angenommen, daß eine Schädelhöhlenöffnung an lebenden Menschen in prähistorischen Zeiten jemals versucht worden war. Die Operationsweise ist eine ungewohnte, aber auch sehr gefährliche. Ich weiß von keinem Exemplar, an dem zu sehen ist, daß der Kranke nach einer solchen Operation wiederhergestellt worden ist. Die Operation besteht darin, daß mit einem Feuerstein oder anderen Steinsägen ein vier-eckiges Knochenstück herausgesägt wurde. Die Trepanationsöffnung ist so beschaffen, daß erfolgreiche Resultate mit dieser Methode nicht möglich gewesen sein können.

Unsere zweite Gruppe umfaßt die

Exemplare, die von der Geschicklichkeit der heutigen noch im Stadium der

Steinzeitkultur lebenden Naturvölker zeugen. Die Methode wird in den Südpazifischen Inseln angewandt, und zwar als Heilmittel gegen Epilepsie, heftige chronische Kopfschmerzen und

Kopfverletzungen, die von Wurfgeschossen aus Kriegen zwischen den Eingeborenen stammen. Auf man-

chen Inseln wird sie tatsächlich als Lebensverlängerungsmittel ausgeführt. Ein Loch wird durch den Schädelknochen mit Hilfe eines scharfen Stückes Lavaglas gebohrt. Muschelschalen und Haifischzähne wurden früher angewandt. Seit der Ankunft des „weißen Mannes“ wird mit Vorliebe Glas von zerbrochenen Flaschen gebraucht. Wir besitzen drei Schädel, die diese Operation gut zeigen, und nachstehend ist eine Photographie von einem Melanesischen Schädel vom Royal College des Chirurgischen Museums aus Neu-Irland zu sehen (Abb. 13).

Zuletzt führe ich eine Reihe von Versuchen an derzeitigen frischen und trockenen Schädeln an, die vollkommen mit primitiven Steinwerkzeugen ausgeführt worden sind.

Meiner Meinung nach gibt es vier Methoden der Schädelhöhlen-

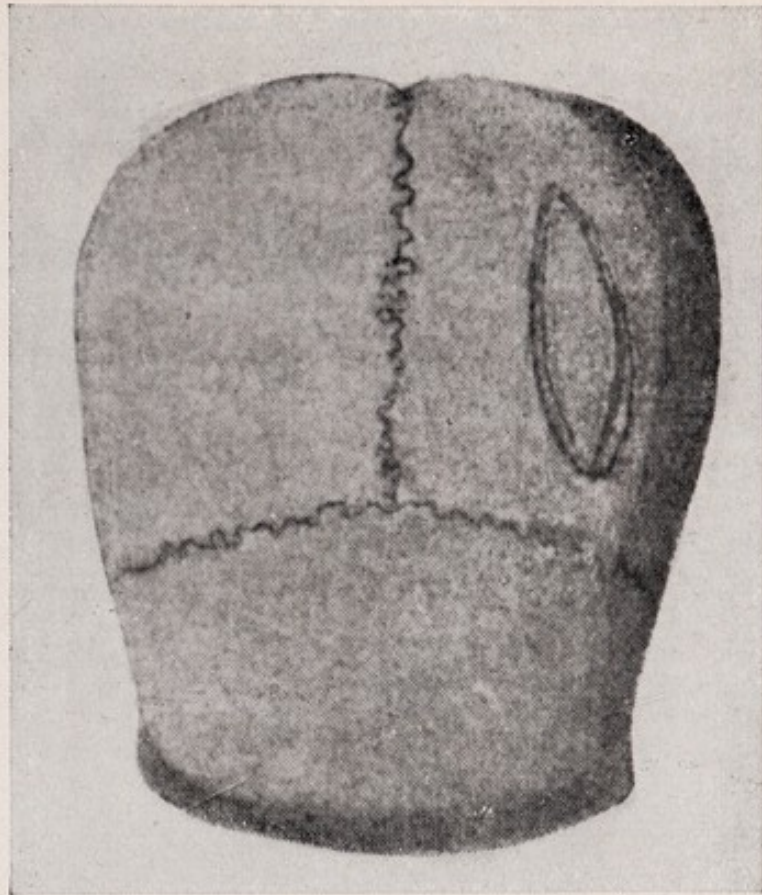


Abb. 8. Das in Peniche gefundene Exemplar



Abb. 12.
Der Peruanische Schädel

öffnung, die von den neolithischen Menschen und den noch im Stadium der Steinkultur lebenden Naturvölkern angewandt wurden. Diese vier will ich nachstehend anführen und jede von den in Frage kommenden Methoden kurz beschreiben.

1. Die Methode, ein Loch in den Schädelknochen mit Hilfe eines Feuersteins od. eines Stückes Lavaglas zu kratzen. Zuerst wird an einer einzigen Linie mit



Abb. 13. Der Melanesische Schädel

einem spitzen Feuerstein entlang gekratzt, bis eine Furche entsteht. Die Seiten der Furche werden dann in Angriff genommen und eine flache beckenartige Ellipse geformt. Diese wird vertieft und verbreitert, indem man die Diploe fortkratzt bis die tabula interna erreicht ist. Während des Eindringens in die tabula interna muß große Sorgfalt angewandt werden, damit nicht etwa die dura mater verletzt wird. Eine Operation in der soeben beschriebenen Art kann am Leichnam in einer halben Stunde ausgeführt werden.

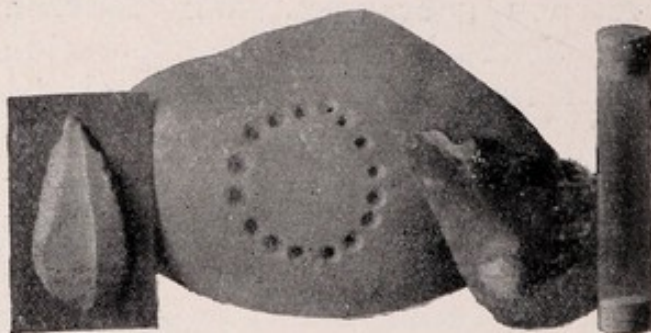


Abb. 14. Schädelöffnung mit Handbohrern

2. Es werden im Kreis Löcher gebohrt und dann die Knochenteile zwischen ihnen mit Feuersteinwerkzeugen durchbrochen.

Phase I. In diesem Falle wird der Ring durch einen Kreis von mit Handbohrern gemachten Löchern gebildet. Das leichte Werkzeug auf der Photographie wurde erst gebraucht, um das Loch anzubohren dann wurde das schwere angewandt, um es zu vergrößern und zu vertiefen (Abb. 14),

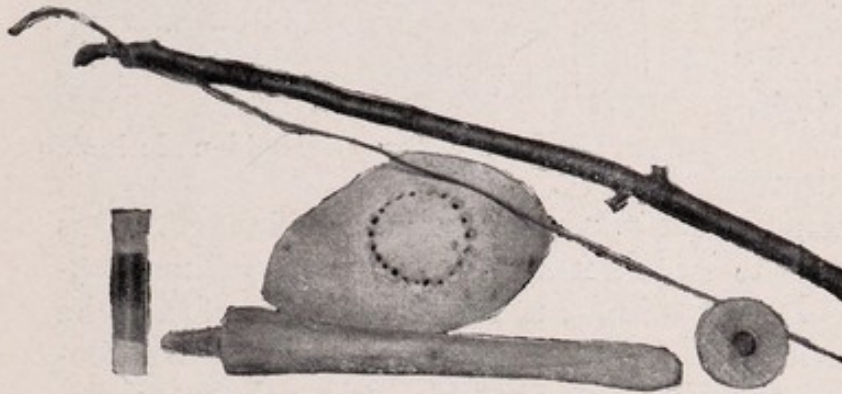


Abb. 15. Schädelöffnung auf mechanische Weise

oder aber (Phase I) der Ring wird von auf primitive mechanische Weise gebohrten Löchern gebildet (Abb. 15). Der angewandte Bogenbohrer ist abgebildet (Abb. 16). Man sieht den Schaft, der

den Feuerstein trägt, die hölzerne Kappe, in der der Kopf des Schaftes sich bewegt, und den Bogen selbst, der aus einem Stück frisch geschnittenen Holzes gemacht ist, mit einem Lederriemen als Bogensehne.

Letzte Phase. In beiden vorhergehenden Fällen wird die Entfernung des Knochenstückes dadurch bewirkt,

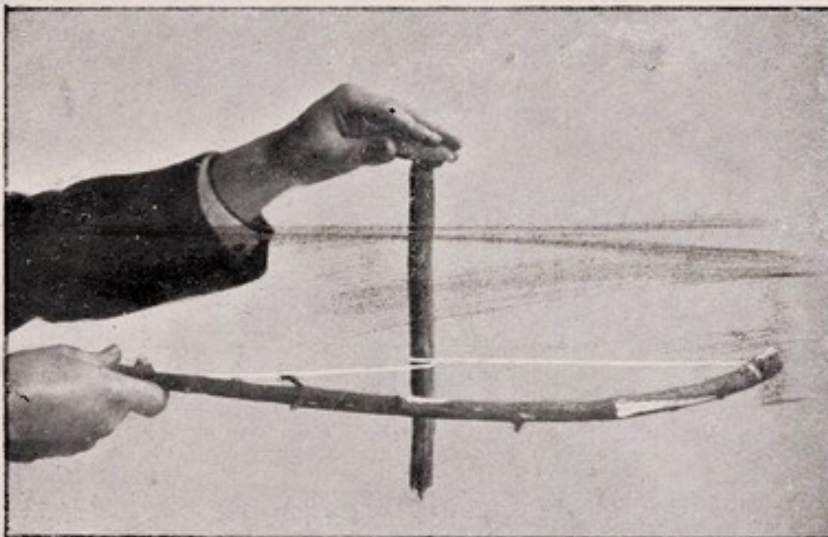


Abb. 16. Der Bogenbohrer

daß man die Knochenverbindungen, die die Löcher voneinander trennen, mit einer Steinsäge oder einem anderen Instrument durchschneidet (Abb. 17).

3. Die „Pflug- (Push-Plough)-Methode“:

Phase I. Mit einem einfachen Feuersteinwerkzeug wird die Furche im Schädelknochen so gemacht, daß man die Spitze mit einer pflügenden Bewegung vorwärtsbewegt. (S. Abb. 9.)

Phase II. Die Furche wird durch die sägende Bewegung eines stärkeren Instrumentes vertieft und verbreitert,

bis die tabula interna erreicht ist (Abb. 10).

Letzte Phase: Nachdem die tabula interna erreicht ist, wird ein Feuerstein- oder Steinwerkzeug als Heber zum Herausheben des Knochenstückes verwandt (Abb. 11).

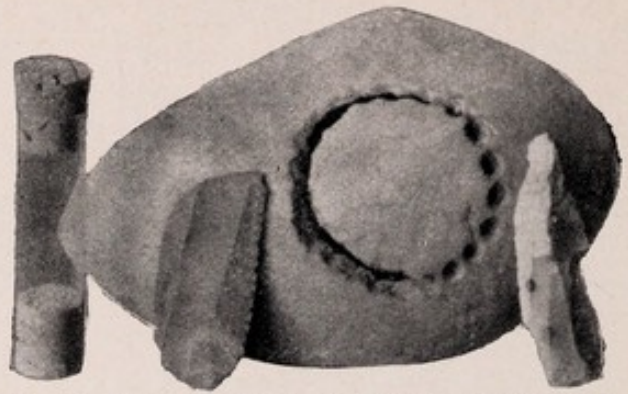


Abb. 17. Letzte Phase der beiden Methoden

4. Die Beseitigung eines viereckigen Knochenstückes mit einer Steinsäge. Das war das von Inka- und Präinkarassen Südamerikas angewandte System. Es ist eine außerordentlich gefährliche Operation und kein Fall von Wiederherstellung ist bekannt. Beim „Squiers“-Exemplar (Abb. 12) schätzt man, daß der Kranke nur ein bis zwei Wochen gelebt hat (Abbild. 18).



Abb. 18. Die von den Inkas angewandte Methode der Schädelöffnung

