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P.C. 11

Prehistoric Man and his Early Efforts to Combat^{19.} Disease

BY

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

The Presidential Address read before the North London Medical and Chirurgical Society, in the Board Room of the Great Northern Central Hospital on May 14th, 1914.



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PREHISTORIC MAN AND HIS EARLY EFFORTS TO COMBAT DISEASE.

LADIES AND GENTLEMEN,—The President of the North London Medical and Chirurgical Society stands, I believe, in an almost unique position. His annual address is always delivered at the close, instead of, as is customary in other societies, at the opening of each new session. This somewhat topsy-turvy arrangement of things merits at least one compensation. When the little boy was asked by the magistrate, "What were your father's last words?" he promptly replied, "Farver never had no last words, Muvver always got those." The president of this Society, not unlike this irrepressible offspring of Mother Eve, is graciously granted the last words, and I wish mine to be those of grateful thanks to you all for the honour you have done me by electing me as your president during the past year.

The subject I wish to introduce to your notice this evening is one relating to the dim and distant past, and is one which, I think, will serve to stimulate the imagination, as well as exercise the more prosaic reasoning faculties. It is always a matter of fascinating interest to delve into anything of a mysterious nature, and the one mystery which, to most of us, far eclipses all others, is that connected with the obscure and inexplicable origin of Man himself. When and in what form did he first put foot upon this planet, and what was the condition of that planet itself that must have cooled to an extent to have permitted the previous introduction of plant, as well as of animal life. At present all seems impenetrable as to the birth of protoplasmic life on this earth of ours, though Professor Sir Edward Schäfer has given us hints of life being chemically formed. If such, indeed, could be proved, how far should we have progressed on our path towards the Unification of Knowledge. At this present moment, however, we must renounce these philosophical speculations and must transport ourselves many millions of years forward, from the creation or formation of what we call "life" to that period in unwritten history known to us all as the Stone Age.

Now the Stone Age must be regarded merely as a stage of culture, as every nation and people on emerging from an animal to a human level, however low, starts with its "Stone Age," passes through its "Copper" or "Bronze" Age, thence through its "Early-Iron" Age, till it eventually arrives at its Historic period, when it begins to depict its acts and its thoughts on stones, pottery, papyri, or coins. The anthropological world is indebted to the late distinguished antiquarian, Lord Avebury, for suggesting the division of the great Stone Age into two parts, namely, the Palæolithic or Old Stone Age and the Neolithic or New Stone Age.

This was no arbitrary division, but a really natural one, and based entirely on geological data. He traced the present geological condition of things back to its source, and this he made his starting-point of the Neolithic Period. In Great Britain and the north-western part of Europe it may be roughly dated as beginning somewhere between twenty and twenty-five thousand years before the Christian Era and lasting till about the year B.C. 2000-1800. It

may thus be roughly said to cover a period something like 20,000 years. The Bronze Age succeeded this and lasted till about the year B.C. 500. After this came the Early-Iron Age, which is represented in Britain by the Late Celtic, Early British, or pre-Roman culture.

Immediately preceding the Neolithic Age was a huge gap which cannot well be estimated, but during which geological changes of a gigantic nature were taking place. This is called the Mesolithic Period. During this transitional period many things were happening, the map of the world was undergoing vast alterations, climates were changing, till, in North-Western Europe, to speak of only one portion of the globe, the dry cold of the later Palæolithic Period had given place to a more temperate and rather moist atmospheric condition. This change in climate led to extremely important results. While many of the animals that roamed our woods and forests during the Palæolithic Period were becoming extinct, among which may be enumerated the mammoth, woolly-haired rhinoceros, urus, cave-lion, cave-bear, and sabre-toothed tiger, others sought sunnier climes, wandering south—among these were the hippopotamus, elephant, lion, leopard, and hyæna; others again chose to live in a temperate climate and these embrace our present British fauna, together with the beaver and the auroch, both of these latter having been now long extinct in this country. A third group of animals preferring a cold climate, to which they had become accustomed during the glacial periods, migrated north or sought the cold mountainous districts of Europe, among these being the musk sheep, glutton, arctic fox, ibex, chamois and reindeer.

And what was happening to Man himself during this long chain of years? In Palæolithic times he was a hunter, living at first by the banks of rivers or on the shores of lakes ("River-Drift Man" he was then called) till he overcame his dread of caves which were dark and gloomy and filled with savage monsters or evil spirits and found the protection they afforded more congenial than his previous rough dug-out homes, situated beside streams or rivers and covered probably by branches of trees and wattles plastered with mud and clay. Having taken to cave-life he began to cultivate Art in a way he had never done before. Although still hunting the mammoth, reindeer and other animals, certain members of his tribe became artists and some of their productions, which we still possess, are of exceptionally high artistic value. We have pictures of the ibex, glutton, wolf, reindeer, mammoth, and other animals drawn on bone, stone and ivory. To two of his carvings I should specially like to draw your attention. One is the conversion of the point of a mammoth tusk into two fleeing reindeers. It was originally probably the handle of a dagger made in one piece out of mammoth ivory and is a beautiful example of true artistic genius. This was discovered in the rock-shelter of Montastruc, Bruniquel, France. The other example is the representation of a mammoth itself, carved out of reindeer horn and was also probably the handle of a dagger. This also hails from Bruni-

quei. The treasures unearthed in the caves of the Dordogne and other places in France give us an insight into the mind and character of the Cave-man. By the skilful way he shaped many of his implements, by the thoughtful manner in which he fashioned his bone needles, awls, sceptres and ornaments for personal adornment, he was evidently a man of high average intelligence. What is our surprise, therefore, to find that when a race had arrived at such a comparatively advanced stage of culture, it should suddenly disappear. But such is the case. Cave-man in France and the British Isles either became extinct or followed the reindeer to

rious God of the Sun, who gave him light and warmth and ripened his corn to a golden harvest. Like the wise men of old he came from the East, probably bringing with him animals he had already domesticated, and we can follow his trail all along the north coast of the Mediterranean Sea by the dolmens and cromlechs he has left behind him. He was no modern pretender, but had a genealogy of proud dimensions, for dolmens have been found on the site of ancient Nineveh. And here I may mention in passing that I cannot believe these wonderfully piled-up buildings of massive stone, that have withstood the wear and tear of thousands of years,

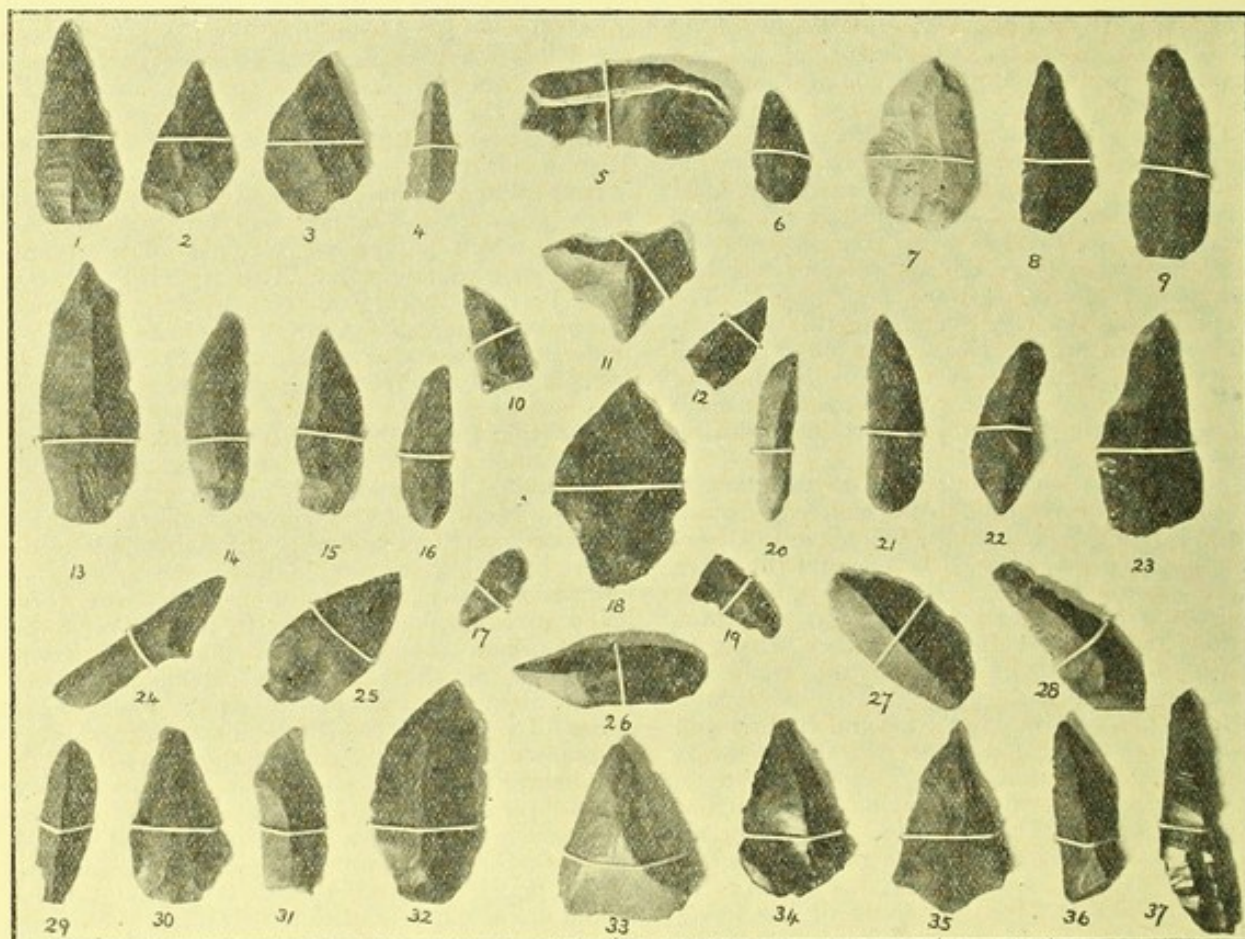


FIG. 1.—NEOLITHIC FLINT FLAKES AS PRIMITIVE SURGICAL IMPLEMENTS.

Nos 1, 8, 13, 14, 15, 21, 24, etc., small sharp knives suitable for trimming edges of lacerated wounds. Nos. 10, 12, 15, 26 and 35, lancets convenient for opening abscesses. No. 11, bone borer. No. 18, implement used successfully as trephine in experiments recorded in this paper.

the far north, and his descendants may be living in those arctic regions to-day as the race we recognise as the Esquimaux.

Neolithic Man was of a different type to his predecessor. He was not a hunter in the same sense as was Palæolithic Man. I think he may best be described as a farmer, a builder and a surgeon; at least relics of these three, the greatest of his occupations, have been handed down to us. I do not say that individually every Neolithic Man possessed these three accomplishments, for it was possible there were specialists even in those golden days. It is, however, quite within the bounds of probability that a versatile Neolithic Man sowed his cereals on the Monday; hunted on the Tuesday; helped (with lever, fulcrum and mother earth) to raise a ponderous stone of some forty or more tons, some ten or twelve feet on to two stone uprights, in the making of a dolmen, on the Wednesday; flaked flints or hafted polished stone hatchets on the Thursday; fished on the Friday with bone or shell fish-hooks or speared fish with barbed bone-pointed javelins; trephined an unfortunate friend who suffered from fits on the Saturday, and on Sunday gave up his time to worshipping the glo-

can have been constructed at the outset merely as ossuaries or tombs, though that they were so is undeniable. I believe some of them were temples and in one at Locmariaquer, in Brittany, called "La Table des Marchands," in which engravings on the end-stone represent rows of full-eared corn-stalks waving in the wind, with a rude picture of a sun in the middle, I cannot but believe that this, at any rate, had once been a temple dedicated to the God of the Sun. Also, I believe, they may have been the palaces of chiefs, for was it not the great wish of prehistoric man generally to make his dead friend as comfortable as possible by imitating his home when preparing his tomb? This was not done altogether from altruistic principles, but because he felt that, if his dead friend were happy and comfortable, he himself would be less likely to be molested by his spirit. The Neolithic Period is divided into three parts: (a) The Campigny Period; (b) The Robenhausen Period; and (c) The Carnac Period. It is this last period, the Carnac Period, that will specially interest us to-night, as we have absolute and certain proof that during this period the surgical operation of trephining was performed.

The above sketches of Palæolithic and Neolithic Man have been given in order to demonstrate that these prehistoric personages were by no means lacking in brains, the former exhibiting specimens of true genius in Art, while the latter produced builders and surgeons of indefatigable and accomplished talent.

To begin at anything like a beginning we must hark back to times much more remote than these, to pre-palæolithic times, indeed, when palæolithic man would be looked upon by us as a cultured gentleman in comparison with those first primeval savages. In those very early days Medicine and Surgery were somewhat different to what they are to-day. Man was then little above the lower animals. His instincts were, therefore, akin to their instincts, and under the same circumstances he would act similarly, only rather more intelligently. The picture that I have of the earliest primitive man, at present, is an admixture of *Pithecanthropus Erectus* and the Piltdown woman. With the former's cranial capacity of 850 c.c. and the latter's simian lower maxilla and canine tooth we are getting dangerously near our cousins, the anthropoid apes. A large male gorilla may have a capacity of 600 c.c. and there would, therefore, be much less distance between him and "the fossil man of Java," than exists between this latter and an average modern European cranium. I need not enter into the controversy as to whether these fossilized human crania belong to the Early Pleistocene or late Pliocene Period. The geologist has strong inclinations towards the former, while the anthropologist has much to say on the latter. Indeed, the very mention of the word "eolith" in a mixed gathering of these two distinguished classes of scientists is apt to act like the sudden appearance of the golden apple of Eris in an otherwise polite and agreeable assembly. I have great faith in what Browning says, "The best is yet to be," and feel that there are still to be unearthed anatomical surprises of unparalleled importance which, when discovered, will necessitate a constant re-arrangement of ideas as fresh material is brought to light.

Now it is well known that animals possess strong self-curative instincts. When they meet with an accident or are stricken with a malady, they endeavour to cure themselves. Let me give a few instances, some borrowed from fact, others from fable, in order to show not only what authentic observation has to say, but also what many of the ancients attributed to the mental processes of the lower animals. Dogs and cats, when indisposed, will eat grasses that have a medicinal action usually of an emetic or purgative nature. (1) The fibrous rooted wheat-grass, *Triticum Caninum*, is frequently eaten by the former. If an animal is ill it seeks out a dark place and starves itself, taking nothing but water. This often is all that is required, as it combines mental and physical rest and a good wash out of all toxic substances. If an animal has been injured, it is noticed to continually lick the affected part, which is a somewhat crude combination of our modern fomentation and massage. Prehistoric Man would most certainly have licked his wounds. Later when he had lost some of his earliest animal instincts he would observe what animals did and imitate them. Thus the use of (2) hellebore was believed to have been discovered from the goat. (3) Virgil tells us that dittany was "eaten by wild goats when they were shot with darts." Pliny gives us one of those delightful fables referred to above, namely, that Bleeding was taught man by the hippopotamus. These are his words: (4) "That intelligent animal, finding himself plethoric, goes out on the banks of the Nile, and there searches about for a sharp-pointed reed, which he runs into a vein in his leg, and having thus got rid of a sufficient amount of

blood, closes the wound with clay." Buffaloes, horses and camels are exceedingly fond of licking salt. Prezevalsky says, "On the Mongolian camels salt, in whatever form, acts as an aperient, especially if they have been long without it. Livingstone says that the chimpanzee, soko, or other anthropoid apes will staunch bleeding wounds by means of their finger or of leaves, turf, or grass stuffed into them. And now we once more resort to fiction. (5) Cornelius Appripa tells us that "The sick magpie puts a bay-leaf into her nest and is recovered. The lion, if he be feverish, is recovered by the eating of an ape. By eating the herb dittany, a wounded stag expels the dart out of his body. Cranes medicine themselves with bulrushes, leopards with wolf's bane, boars with ivy; for between such plants and animals there is an occult friendship." Among birds the snipe appears to be particularly intelligent. M. Fatio quoted before the Physical Society of Geneva the case of a snipe who with his beak and feathers makes a dressing, applies plasters to bleeding wounds, and even binds broken limbs with strong ligatures. M. Magnin corroborated this in the case of a snipe which he observed fly away with a broken limb, and later found with the fragments of the limb forced into a parallel position and there secured by a splint made of intermingled feathers and moss and bound round the limb, in a spiral form, by a flat-leaved grass and fixed by means of a sort of glue. (6) Withington reminds us that a number of these stories that seem improbable must not be entirely refuted, and he cited the fact that Count Mattei, in recent years, declared he discovered his alleged remedies by observing the plants eaten by a mangy dog in the Apennines. So much for what animals and birds do for themselves when confronted with illness or injury. Primitive man did likewise, only always a little more. Now comes the great separation, when Man stepped away from beasts and birds and began to think for himself. Naturally he began by thinking wrongly, and this was brought about by the development of his imagination. And here I may remind you that imagination is one of those forces that, if directed on right lines, is the very impetus that is essential for progress in both Science and Art, and is the true basis of originality and even of genius itself, while, on the other hand, if allowed to run an undisciplined course will produce a riotous confusion of conflicting ideas with delusions of a detrimental or even dangerous character.

At this moment we must pass, and not irrelevantly, to the history of medicine. This has been divided into three great parts by two important landmarks, and these landmarks correspond with the lives of two illustrious men. The first of these was a Greek who was born in the year B.C. 460, and was no other than he who has been distinguished by the title "The Father of Medicine." I refer, of course, to Hippocrates. The second, no less eminent, was, I am proud to think, an Englishman, and his name is a household word among all scientists. I refer to William Harvey. These two men stand for the commencements of two great epochs in medicine and divide the history of medicine into three prominent parts—namely: (1) The period from the earliest primitive times to the coming of Hippocrates; (2) from Hippocrates to the coming of Harvey; and (3) from Harvey to our own time. To-night we are only concerned with the first period of this division, but it is necessary to point out that Hippocrates entirely altered the whole system of medicine, transforming it from a bewildering chaos of superstitious and frenzied fancies to a definite science which had for its aim the careful collecting of symptoms of diseases, the courses they ran and the best treatment that could be applied. No

wonder the name of Hippocrates stands out as a shining light in a time of darkness and superstition, when truth itself was at an amazing discount. I said just now that it was the imagination of man that first led him to think wrongly, and I will explain this by saying that the first period in the

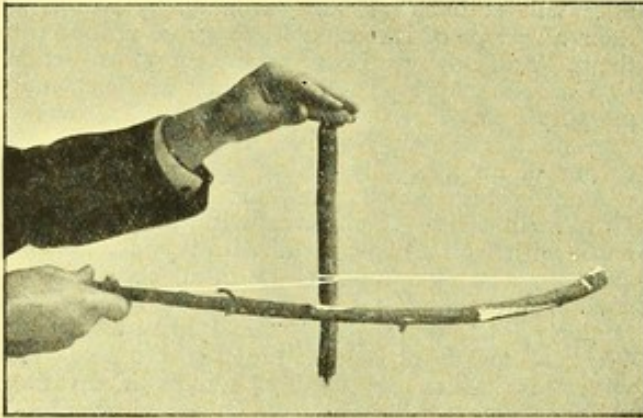
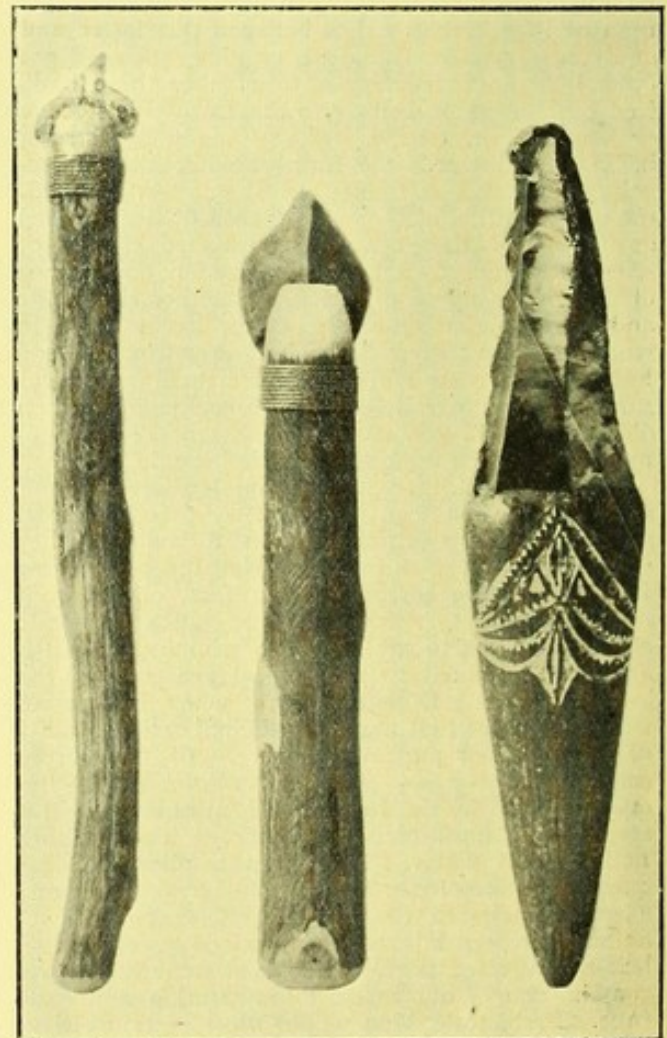


FIG. 2.—Flint-pointed bow-drill used in first stage of trephining skull for removal of rondel of bone.

History of Medicine is known as the Instinctive Period, or the Period of Demonology. It might equally well have been called the Experimental Period, for was it not during this time that Man was making his first tests—and daring tests many of them must have been—to discriminate between various leaves, roots, berries, fruits and fungi to ascertain their dietetic and medicinal values? Now I wish to state here that as embryology epitomises evolution, so the study of the present-day primitive savage unfolds to us the larger history of prehistoric man. It was no doubt the twin mystery of Disease and Death that first stimulated man to think, that is why the Medicine-man and the Priest were one and the same individual at the outset. The position of the Medicine-man in the tribe must have been a most exalted one. In a fascinating book just published on the American-Indian called (6) "The Vanishing Race," this is well shown. "The Indian," it says, "aspires to be a great hunter; he seeks fame as a noble warrior, he struggles for the eagle feathers of distinction, but his greatest longing is to become a Medicine-man and know the Great Mystery." Witchcraft and magic early took a chief part in the treatment of disease, and Demonology reigned supreme for many millenniums. Demonology is based on "Animism," and this latter briefly consists in the belief in the influence of the spirits of dead persons. Animism has its beautiful as well as its hideous aspect. The wide belief among savage races that inanimate objects, as well as animate beings, are all possessed of a spirit has been well demonstrated lately by Maeterlinck's exquisite allegory "The Blue Bird," which shows the happy side of this creed. The unhappy side is illustrated by the reverence bestowed on spiritual monsters and the propitiation required of them. Can we afford to smile or be cynical at such beliefs? Was not the God of the Hebrews on many occasions regarded as a demon of unparalleled dimensions, to wit (7) "The Lord shall laugh at him, for he seeth that his day is coming"? The three chief theories of disease were: (a) The anger of a disaffected spirit; (b) witchcraft; or (c) offended spirits of dead persons. (2) The Mantira, a low race of the Malay Peninsula, believe that there is a separate disease-spirit for every illness (this is not unlike our present germ theory), one for small-pox, one for inflammation of the hands and feet, and one for hæmorrhage; in the latter case the spirit is thought to fasten itself on the wound of the individual and suck out his blood. In the Indian Archipelago disease-spirits are con-

ciliated by presents and dances. (8) In Polynesia every illness is set down to deities which have been offended or which have been urged to afflict the sufferer by their enemies. (9) The Prairie Indians treat all diseases in the same way, as they must all have been caused by one evil spirit. (10) The aboriginal New Zealanders had a separate demon for each part of the body to cause disease. Tonga caused headache and sickness; Moko-Tiki was responsible for chest pains, and so on. The Zulus believe that spirits, when angry, seize a living man's body and inflict disease and death, and when kindly disposed give health and cattle. (11) The Dayaks of Borneo acknowledge a supreme God, but attribute all kinds of diseases and calamities to the malignity of evil spirits. Their system of medicine consists in the application of appropriate charms or the offering of conciliatory sacrifices. Verily the whole world is kin, for we have only to step across the channel into Brittany to-day, to find that similar pagan ideas are still universally accepted there, but, of course, under very different auspices. The Breton's deities are neither Tonga nor Moko-Tiki, but if they are suffering from boils they offer prayers to St. Maudez, if from fevers they petition St. Gonéry. (12) The earth from the



FIGS. 3, 4 AND 5.—PRIMITIVE SURGICAL INSTRUMENTS. Fig. 3, hafted shark's tooth; Fig. 4, hafted flint flake; Fig. 5, hafted obsidian flake (Admiralty Island knife).

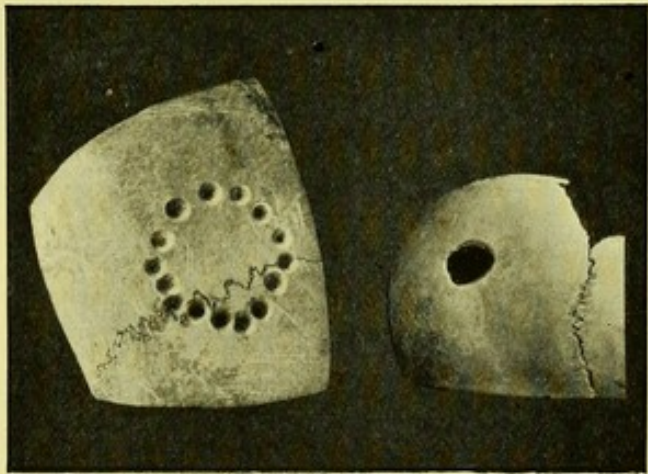
tomb of this latter saint is considered a cure for any kind of fever. It is sold in little muslin bags and tied round the necks of the patients. (2) In the XVth century the Catholic Church had a very long list of saints, each of which presided over some special complaint. St. Agatha healed sore breasts, St. Apollonia toothache, St. Benedict stone,

St. Blaise quinsy and bones sticking in the throat, St. Erasmus colic, and so on indefinitely.

It must have been but a short step for the first man who, firmly believing in demoniacal possession, and at the same time suffering either from frequent fits, severe pain in the head of a periodic or paroxysmal nature, chronic hemiparesis, or unbearable Ménière's disease, made an effort to free himself from his fetters. Life had become an intolerable burden to him, and he believed that there was a devil inside his cranium that was petitioning somewhat persistently for liberty. Was there not the Medicine-man who always attended to members of his tribe when accidents befell them, who stopped their bleeding and dressed their wounds? He would go to him and ask him to make a hole in his skull to let out this wicked and restless spirit. The first operation must have been troublesome and tedious, not to mention its extreme danger. The scalp had to be cut through with a sharp piece of flint or obsidian, the bleeding stopped, and the scraping of the bone commenced. This would take the first operator many hours to perform, but the patient was helpful and anxious to get rid of his devil and possessed that unflinching stoicism to pain that is characteristic of the savage and the operation would be at length completed. If the patient recovered, whether he obtained relief from his symptoms or not, he was henceforth revered as a sacred person. We can thus see why, in some districts, trephining was so prevalent, for prestige seems to have been purchased by undergoing this operation. After death the skull was eagerly sought after. The trephined portion was removed by flint saws, and pieces of bone, edged by part of the healed cicatrix, were removed. A hole was bored through the centre of this trophy, and it was henceforth regarded as a talisman that if worn would insure the wearer from getting the disease from which the operatee had suffered. So great a demand appears to have been made for these amulets, at one time, that we actually find spurious imitations were made, some fashioned from horn, and others made from untrepined pieces of bones, so that a portion of the healed cicatrix became an essential to prove its authenticity. The year 1868 was a memorable one, for it was in this year that M. Prunières discovered in a dolmen near Aiguères the first trephined neolithic skull to which the attention of scientists was drawn. A large piece of bone had been removed, and the smoothness of the edges made the discoverer think that this had been purposely polished for the lips, in the converting of the skull into a drinking-cup, a practice well recognised among savage tribes. The finding of five other skull fragments, in the same dolmen, all partially polished in the same way, made the finder think that these also were parts of converted drinking-cups. The interpretation of this mystery was left to Professor Broca, who showed indubitably that the holes in the skulls had been made during life, had been done by scraping, and that, after the death of the individual, portions of such skulls had been evidently eagerly sought after. He came to the conclusion that the operation was usually performed on children and from what he says: (13) "it could be effected on the skull of a child in less than five minutes, whilst on an adult it would take an hour,"—it will show he had probably made some careful experiments. Broca believed that the operation was performed for the cure of epilepsy and convulsions, and he argues from the superstitious practices found in connection with it that at that period, as well as long subsequently, these diseases were regarded as peculiarly the work of spirits.

He quotes from a treatise upon epilepsy (14) by

Jehan Taxil published in 1603 not only to show that infantile convulsions were confounded with true epilepsy, but that, at that time, epilepsy and kindred diseases were looked upon as spiritual diseases, the works of gods or demons, while the remedies recommended in the treatise were highly suggestive, consisting sometimes of the ashes of a human skull applied as a plaster on the crown of the head, sometimes the same administered in potions or pilules, and sometimes as nodules to be worn round the neck; while sometimes also *scraping the skull* was recommended. Broca goes on to show that (15) "all through the middle ages, and even after the Renaissance, the substance of the human skull was used in the treatment of epilepsy, the skulls of Egyptian mummies being regarded as the most efficacious; whilst in the last century all the pharmacies contained a bottle labelled 'Ossa Wormiana' for the treatment of epilepsy, the peculiar efficacy of the triangular lambdoidian bone consisting in its form, which resembles that of the amulet cut from the human skull, thus showing the step between prophylactic and mystic medicine." Broca thought that trephining was in vogue throughout the entire Neolithic Period on



FIGS. 6 AND 7.

Fig. 6, Skull of Male (68 years) trephined (1st stage only) by flint-pointed bow-drill (Fig. 2). Time taken 25 minutes. Fig. 7, Skull of infant (9 months) trephined by oyster shell (*Ostrea Edulis*). Time taken 50 minutes.

account of the fact that trephined skulls had been found in the cavern of the "Homme Mort" (Lozère) which dates from the commencement of the Neolithic Period.

It might have been thought, considering the number of trephined skulls that have been excavated in France, that the custom would have spread to the British Isles, as only the Channel separated the two countries, and we have evidence that there was no inconsiderable traffic between them in Neolithic times. I have only been able to hear of three such skulls that have been unearthed in this country, and I should be most happy if anyone knowing of any other specimens would kindly inform me. The three specimens of which I know are: (a) A skull that was dredged from the bottom of the docks at Port Talbot, South Wales, in or about 1870-2. I have a photograph of this skull to show you this evening, kindly lent me by Mr. Thomas Gray of the above-mentioned place. This skull shows a frontal excavation over the right supra-orbital region. Not having seen the specimen I am unable to give any opinion. (b) An interesting specimen showing a ring-trephine as if an effort had been made to remove a rondel of bone. This specimen was excavated in the autumn of 1863 from a long barrow, near Bisley, by the late

Dr. W. H. Paine, assisted by Dr. Henry Bird. I have to thank Mr. A. E. W. Paine, son of the first-mentioned excavator, for kindly furnishing me with a photograph, which I can show you this evening. Professor Keith has seen this specimen and states "there is no mark of inflammation or

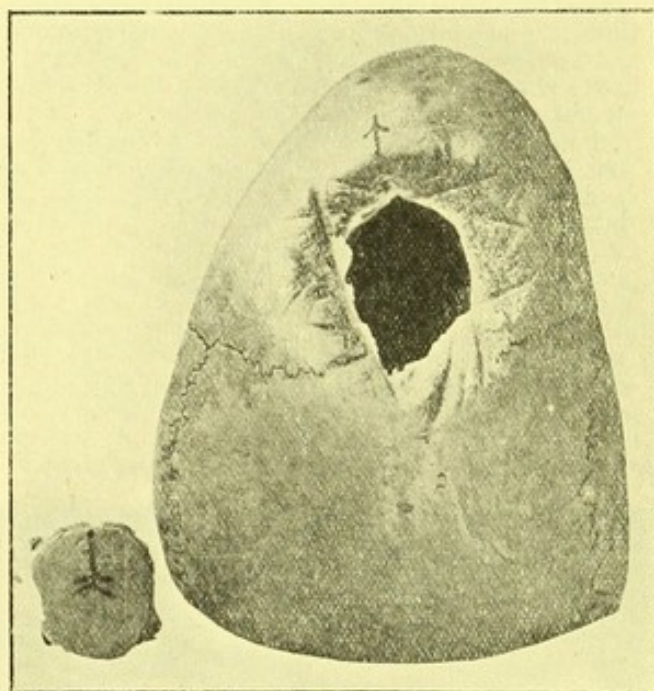


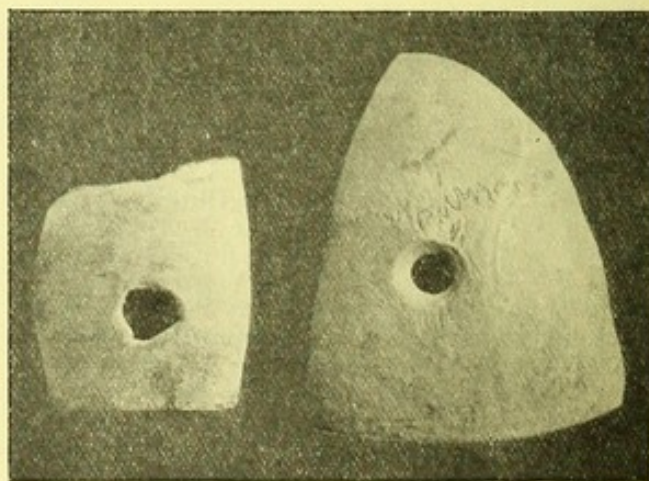
FIG. 8.

Skull of female (40 years) trephined first by bow-drill (as in Fig. 6), then completed by cutting and sawing bridges between holes by short strong flint knife (Fig. 1, No. 5). Rondel of bone removed and seen to left of skull. Time taken 65 minutes.

disease on the bone." This probably belongs to the Bronze Age. (c) The third specimen is one which I have seen in the Northampton Museum, owing to the kindness of Sir Victor Horsley, who conducted me thither. I can emphatically state that the three trephine holes in the form of a triangle, on the vertex of this skull, were not made during the Stone Age nor by any Stone Age implements. It is dangerous to make statements if it is not known from which stratum a specimen has been obtained or what implements or animal remains may have been discovered in association with it. All that is known of this specimen is that it was found "outside the British camp called Hunsbury," in Northampton. On a modern skull I have made as exact a model as I can of the three holes, as regards size and relative position, and it is my opinion that they were made on the original, not from any demonological reason, but as a means for suspending the skull as a trophy by a Bronze Age or later headman. This model is here for your inspection and criticism. I have to thank Mr. Thomas J. George, curator of the Northampton Museum, for his kindness in sending me tracings of (16) General Pitt-Rivers's plates of this skull, which I have also here for your inspection this evening. It will be seen from the above that it is probable that two out of these three trephined specimens are not neolithic. If the third belongs to this period, it is the only one that I know of in this country.

In the Museum of the Royal College of Surgeons of England are six skulls of modern Melanesians that have been either partially or wholly trephined by natives of these islands. Owing to the courtesy of Professor Keith, I am able to describe them in this paper. In three of these specimens a complete perforation has been made in the cranial bones, and in the remaining three either part of the outer table alone, or the

outer table and diploe have been removed by scraping. One, a male, from New Britain (presented to the Museum by Dr. C. G. Seligman), has a large hole measuring 28 mm. by 34 mm. in the right occipito-parietal region. The outer edge of this hole is thin, bevelled and smooth and shows a healed surface, demonstrating a successful operation. Of the five other skulls, all of which come from New Ireland and were presented by Dr. W. E. Redman, of Picton, New Zealand, one shows two frontal scrapings. On the left side the outer table has been completely rubbed through, and on the right is a circular scraping through the outer table leaving a boss of bone in the centre, which looks as if an attempt had been made to remove a small rondel of bone. Why these two operations should have been made on the same skull and both in the frontal region is difficult to imagine, unless the symptoms, for which the first operation was performed, having still persisted, a second operation was demanded. In the third skull there is a beautifully rounded hole measuring 14 mm. by 15 mm. in the left frontal region. The edges of this hole are smooth and rounded and show an excellent healed surface. The reason for the operation having been performed in this case is obvious, as there is a diseased patch of bone with considerable erosion in the mid and right frontal region. The patient had need of being released in this instance as the disease is undoubtedly of syphilitic origin. In the fourth skull there is a large patch of osteitis measuring 45 mm. by 60 mm. over the right frontal region. The outer table is completely eroded and posterior to this the skull has been sawn through and shows the disease has caused a wide separation of the two tables of the skull. It is not surprising, therefore, to find that the surgeon advised, or the patient solicited, the trephining of a patch 17 mm. by 28 mm. in front of this diseased surface, as probably a direct counter-irritation to relieve severe and continuous headache. The skull has not been perforated, but the outer table has been scratched through and the surface is smooth and shows every sign of healing. In the fifth skull there is



FIGS 9 AND 10

Fig. 9, Skull of infant (10 weeks) trephined by obsidian flake. Time taken 8 minutes. Fig. 10, Skull of male (44 years) trephined by obsidian flake. Time taken 28 minutes.

a large elliptical scraping, measuring 48 mm. by 35 mm. in the right parietal region. There is a deep furrow in the centre of this scraping which shows one the method by which it was done. It is all but perforated. In the sixth and last specimen there is a large perforation, 23 mm. by 40 mm., over the left frontal region and part of this hole is filled up with fresh callus that has formed during the process of healing, which has evidently

given a very successful result. All these cases, I have not the slightest doubt, were done by scraping the bone with obsidian flakes. The usual custom in Melanesia after the operation has been performed is to replace the scalp, which was incised in the first instance by an obsidian knife, and simply bind it in position by a bandage made of banana-fibre.

Being anxious to ascertain how Neolithic man

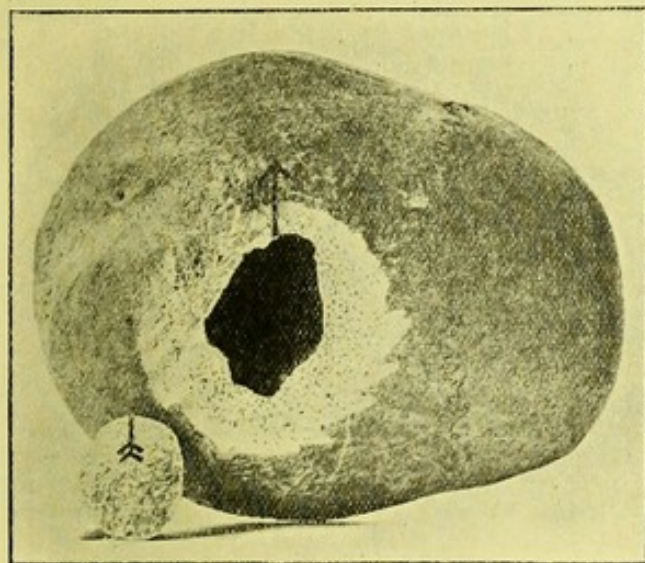


FIG. 11.

Dry specimen (female) trephined by hafted obsidian knife (Admiralty Islands) (Fig. 5). Rondel removed and can be seen below specimen. Time taken 78 minutes.

trephined living subjects with the crude materials at his disposal, I made a series of some 19 experiments both upon recent and dry skulls. When showing the results of some of these experiments to Professor Keith, he informed me of a (17) pamphlet by Dr. Lucas-Championnière, in which I would find that several of my experiments had already been done by him. I was quite unaware of this brochure when making my tests. Referring to this pamphlet, it appeared to me that Dr. Lucas-Championnière had only experimented with flint. I experimented, in addition, with obsidian, sharks' teeth, shell and slate. I used flint in two ways, first in the form of neolithic scrapers, and secondly, as a hafted sharp point to a bow-drill. The bow-drill, I may mention, is one of the oldest forms of mechanical contrivances. Without any hard material affixed to its end it has been used from time immemorial by the Sioux and Canadian Indians to make fire by the friction caused when used against another piece of wood, some easily inflammable material, such as touchwood or dried leaves being in the near vicinity for catching the spark. With a sharp point of some hard material it was used for drilling holes. In a clever prehistoric romance, entitled (18) "The Master Girl," the bow-drill is shown most reasonably to have been invented previously to, and to have given the first idea of the ordinary bow, from which arrows are shot. Obsidian I also used in two ways. First, as obsidian flake scrapers, and secondly, as hafted implements in the form of an Admiralty Island knife. I used two kinds of sharks' teeth, both being hafted in wooden handles. A small variety, which I only employed in the case of an infant's skull, I obtained from a socketed club made by natives of King's Min Islands; this specimen has been identified by Mr. C. Tate Regan, of the Natural History Museum, as belonging to "Carcharias glaucus or a related species," while the larger specimen, which I used for two adult skulls, as *Galeocerdo arcticus*. The shells I

employed were beach-worn specimens of a species of the oyster (*ostrea edulis*), picked up on the north coast of Brittany. For slate I used an ordinary piece of slate, shaped like a scraper.

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, such as the South Pacific Islands, 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 if care be not taken minute particles may swiftly scintillate into the eyes of the operator. I may remind you that while flint is a silicious sedimentary deposit, obsidian is of igneous formation. Both flint and obsidian when freshly flaked are excellent substances for surgical purposes. Both by virtue of their smooth surfaces, and here obsidian would take the pre-eminence, are aseptic, and this is a point of infinite importance when coming in contact with the dura mater. It surprised me at first, in no small measure, to find how cleanly and easily a flint knife can cut through the scalp, and obsidian, of course, is even better, for in the Andaman Islands, in the present day, the natives shave their heads with obsidian knives. The method I employed for scraping the trephine-hole in both flint and obsidian was the following:—Having selected a site on the skull and also a suitable flake, I scraped as nearly as possible along a single line. This line I gradually converted into a groove, which soon showed two more or less prominent edges. The outer table of the

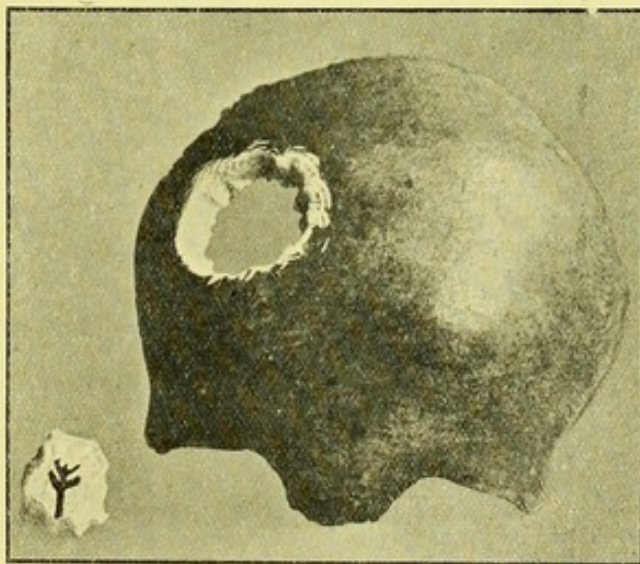


FIG. 12.

Dry specimen trephined (rondel removed, to the left of specimen) by hafted shark's tooth (Fig. 3) Time taken 1½ hours.

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 only now 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 bruising 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 favour in any other way, he would naturally fling it aside and choose another. As regards the bow-drill, I got my carpenter to affix a neolithic flint-point into a wooden shaft. I then bored a succession of holes, some fifteen in number, in a circular manner on the place chosen. These I enlarged till they touched one another. At this point there is great risk of shattering the flint-point or of unhafing it altogether, as it strikes with force the broken edge of an adjoining hole. Having completed the circle with as deep holes as is expedient, I next broke down the edges between them with a sharp and strong flint-flake, and then, by means of sawing and scraping, eventually removed a complete rondel of bone. This is an extremely tedious and clumsy operation and not in any way calculated to bear comparison with the simpler method of scraping. As regards sharks' teeth as surgical instruments, I am satisfied that 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 (as in the case of the bow-drill) packed as closely together as possible, 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 as clean and neat as the most fastidious surgeon could wish. Trephining by shell was probably never attempted by Neolithic man in Europe, though primitive man most certainly used shell-knives for ordinary use and shell-lancets for opening abscesses in the South Pacific Islands. It took me about 25 minutes to trephine the skull of a nine-months-old infant. This, in time, bears most unfavourably with the same operation on a fourteen-months-old child by a flint scraper, which only took 9½ minutes, or that of a sixteen-months-old child, which took a quarter of an hour. During the scraping process the shell, of course, wears badly, and there is much more detritus than in the case of flint or obsidian. One specimen I experimented upon with slate. Slate has been found in many neolithic tombs, and it was doubtless used for domestic purposes, as the patting of butter or the making of cheese. I am quite convinced it was never employed as a trephine, for it is too soft and friable; but I made this experiment in order to test the value of slate as a boring implement as regards bone. It took me nearly 50 minutes to make the small hole I was able in

the skull of a man 44 years of age. Subjoined is a list of my experiments. The originals are exhibited in the Historical Medical Museum, and I have to thank the curator, Mr. C. J. S. Thompson, for the loan of the trephined aboriginal skulls I am able to show you this evening.

(A) FLINT					
(1) FLINT SCRAPERS					
No.	Sex	Age.		Time Taken.	
1	Female	14 months		9½ minutes	
2	"	16 months		15 "	
3	"	5 years	Frontal hole	18 "	
4	"		Parietal hole	15 "	
5	"	21 years		30 "	
6		Dry Specimen		28½ "	
(2) BOW-DRILL (Flint-point)					
7	Male	68 years (1st stage only)		25 "	
8	Female	40 years (Rondel removed)		65 "	
(B) OBSIDIAN					
9	Male	10 weeks	Near fontanelle	1½ "	
10	"		Parietal region	8 "	
11	Female	44 years		28 "	
12		Dry Specimen		31 "	
13	Male	44 years (Admiralty Isd. knife)		30 "	
14		Dry Specimen [" (Rondel removed)]		78 "	
(C) SHARK'S TEETH					
15	Female	14 months (Carcharias glaucus)		12 "	
16		Dry Specimen (Galeocerdo arcticus)	Partial	1½ hours	
17		" " Complete		1½ "	
(D) SHELL (Ostrea Edulis)					
18	Female	9 months		Circa 25 minutes	
(E) SLATE					
19	Male	44 years		50 "	

We have been looking back to-night into the far-away past and have been endeavouring to piece together the history of prehistoric man from specimens of his handiwork that have been heirloomed to us by the sheltering hand of Nature, who has protected them for us, either by covering them over with the debris of rock or hiding them under stalagmite or in the deep breccia in the floors of caverns. To this has been added a passing glimpse at the methods of present-day primitive tribes. Tylor says (19) "The uniformity which so largely pervades civilisation may be ascribed, in large measure, to the uniform action of uniform causes." Thus it is that the combination of these two parallel studies enables us to get a true insight into the life of prehistoric days. For a moment let us look forward, far into the future, to the day when cancer will no longer be a terror, when tuberculosis will be a rare or unknown disease, and when lymphadenoma and lymphatic anæmia will be understood and preventable. In these halcyon days the advanced medical-scientist, when looking back on the opening years of the twentieth century, will state that radium had only just been discovered, electricity was only used in a limited manner, and that scientists of that day were only then wresting hypnotism from the hands of the shrewd and clever charlatan. They will possibly look back upon these days as we now look back upon the Age of Stone. May they be as gently critical upon us and our methods as we feel towards prehistoric man and his early efforts to combat disease.

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