Corpvs Medicorvm Graecorvm

Hippocrates
On head wounds

Edition, translation and commentary
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CMG I 4,1, Berlin 1999

ÜBERSETZUNG

HIPPOCRATES

ON HEAD WOUNDS

1. The heads of men are not all alike, nor are the cranial sutures arranged the same in all. He who has a prominence at the front of his head – a prominence is a rounded projection of the bone beyond the other (bone) – has his cranial sutures arranged as the letter *tau* (T) is written. For he has the shorter line situated transversely above the prominence, and the other, longer line situated longitudinally through the middle of the skull, extending invariably to the neck.But he who has the prominence at the back of his head has 2
his sutures arranged the reverse of the former. For the shorter line is situated transversely above the prominence, and the longer line is situated longitudinally through the middle of the skull extending invariably to the forehead. And he who has a prominence at both ends of his head, both front and back, 3
in the same manner has his sutures arranged as the letter *eta* (H) is written. The long lines are situated transversely above each prominence, and the short line longitudinally through the middle of the skull (extending) in the direction of each (prominence and) terminating in the long lines.But he who has 4
no prominence at either end has his cranial sutures as the letter *chi* (X) is written. The lines are situated, one transversely extending to the temple (on either side), the other longitudinally through the middle of the skull.

The bone of the midpart of the skull is double. The hardest and densest 5
part of it is both the outermost, the even surface of the bone just under the scalp, and the innermost, the even undersurface of the bone, next to the membrane (dura mater); passing from the outermost and innermost layers the bone always goes from the hardest and densest parts to the softer, less dense and

more porous bone and into the diploe. And the diploe is the most porous and the softest part, especially full of empty spaces.Indeed, the entire skull, ex- 6
cept a very small part, the outermost and innermost layers, is like a sponge, and the bone contains within it many moist fleshy areas of similar appearance, and, if one rubs them with the fingers, blood will come from them. There are also in the bone rather thin hollow vessels full of blood. This, then, is the situation regarding hardness, softness and porosity.

2. But, in respect to thickness and thinness, the bone at the bregma is the thinnest and weakest of the entire skull, and in this part of the skull the bone has the least and thinnest flesh over it, and there is the most brain under this part of the skull.The result of such an arrangement is that, when some- 2
one is wounded equally or less – the wounds and weapons being the same size or smaller – the bone in this part of the skull is more readily crushed, fractured or crushed in, and (the injuries) are more often fatal, and medical cure and escape from death more difficult (with wounds) here than in any other part of the head. When equal +or smaller+[1] wounds are sustained, the person who is wounded the same or less and who is going, in any case, to die from the wound, dies within a shorter time when he has the wound in this part of the skull rather than anywhere else.For at the bregma the brain is 3
most rapidly and acutely sensitive to the ills that occur in the flesh and the bone, since at this spot the brain is under the thinnest bone and the least flesh, and the greatest mass of the brain lies under the bregma.Of the other 4
parts, that at the temples is weakest. For at the temple is the junction of the lower jaw with the cranium and here there is up and down movement, as of a joint. Also near it is the organ of hearing, and through the temple stretches a hollow and powerful blood vessel.

All of the skull behind the vertex and the ears is stronger than any part 5
in front, and this bone has a larger and deeper layer of flesh over it.The re- 6
sult of these conditions is that, when someone is wounded to the same degree or more severely, with injuries and weapons that are alike and equal or greater, in this part of the head the bone is less seriously fractured and crushed in. And if a person is going to die in any case from the wound, he

[1] +or smaller+: see the app. crit.

who has his wound at the back of the head will take a longer time to die. For suppuration of the bone takes a longer time to occur and to penetrate down to the brain because of the thickness of the bone. Also less brain lies under this part of the skull. And, generally, more of those wounded in the back of the head escape death than (of those wounded) in the front. Also, whoever is going in any case to die from his wound, wherever on the head he may have the wound, lives longer in winter than in summer.

3. *Hedrai* of sharp, light weapons, when they occur by themselves in the bone, without fracture, crush-injury or depressed crush-injury (depressed fracture) – and they occur equally in the front and the back of the head –, do not, at least as a natural consequence, cause death, even if it happens.But 2
a suture, appearing in a wound when the bone has been laid bare, wherever in the skull the wound may be, is the weakest spot to withstand injury or weapon if the weapon happens to lodge in the suture itself. This is especially so if the wound occurs in the bregma, at the weakest spot in the skull, and if the sutures happen to be near the wound and the weapon strikes the sutures themselves.

4. Skull injuries are of a number of types, and for each type several forms of injury occur in the wounding.The skull is fractured when injured 2
and, in addition to the fracture, a crush-injury necessarily occurs in the bone surrounding the fracture, if (the skull) is indeed fractured. For the very weapon that fractures the skull also crushes it to a greater or lesser extent, both at the fracture site and also in the bones surrounding the fracture. This is one type. | The forms of fractures are manifold. For some fractures are rather thin 3
and very thin so as not to be evident, either immediately after the injury or in

the days during which the patient could be helped in his suffering and saved from death. On the other hand, some of the fractures are rather large and wide, and some are very wide.There are also some of them that are fractured 4
for a longer distance, others shorter, and some are fairly straight, some very straight, and others rather curved and still others very curved; and some are moderately deep while others extend deep and through the whole bone.

5. The bone may be crushed but retain its normal position and have no fracture associated with the crush-injury. This is a second type. | There are 2
many forms of crush-injury: For (the bone) is crushed more or less, both to greater depth and through the whole bone, or to less depth and not through the whole bone, and to a greater or less extent in length and breadth.Howev- 3
er, not for a single one of these forms is it possible to discern, simply by looking, what its shape is or what its extent is. For it is not evident to the eye immediately after the injury whether a crush-injury has occurred or not, even when (the bone) has been crushed and the damage done, just as some fractures cannot be seen when they are far (from the site of injury) and when the bone has been broken.

6. The bone is crushed in from its normal position, depressed with fractures; for otherwise it could not be crushed in. For the crushed-in bone, both broken off and shattered, is crushed in, depressed away from the rest of the bone which retains its normal position. And, of course, in this situation fracture will accompany the depressed crush-injury. This is a third type. | And de- 2
pressed crush-injuries have many forms; for they may extend over more or less of the bone, may be more depressed and deeper or less depressed and more superficial.

7. Next, when a weapon *hedrē* occurs in the skull, fracture may occur in addition to the *hedrē*. And, if fracture does in fact occur, crush-injury too, in addition to the fracture, necessarily also occurs to greater or less extent, where the *hedrē* and fracture occur and in the bone surrounding the *hedrē*

and fracture. This is a fourth type. | And *hedrē* may also occur with crush-in- 2
jury of the bone around it, but without fracture being added to the *hedrē* and
crush-injury by the weapon. This is a fifth type. | And weapon *hedrē* occurs in 3
the bone; for (a skull injury) is called a *hedrē* when the weapon, lodging in
the bone, makes a clear imprint where it lodged, while the bone remains in
its normal position. This is a sixth type. | For each type there are many forms: 4
And concerning both crush-injury and fracture, if both of them accompany
the *hedrē*, or if crush-injury alone accompanies it, it has already been pointed
out that many forms occur, both of crush-injury and of fracture. And *hedrē*, in
and of itself, is longer or shorter and more curved or straighter or rounded.
And, of such a type, many other forms occur, depending on the sharp edge of
the weapon; these same forms may also be more or less deep and more or less
narrow and either fairly broad or very broad where they have formed a cleft.
For a cleft in the bone, however great its length and breadth, is a *hedrē* if the 5
other bone surrounding the cleft remains in its normal position and is not
crushed in, along with the cleft, out of its normal position. In that case it
would be a depressed crush-injury and no longer a *hedrē*.

8. The bone is injured in another part of the head than that in which
the patient has his wound and the bone is stripped of flesh. This is a seventh
type. | When this situation occurs you can do nothing to help. For, if the pa- 2
tient has suffered this damage, it is not possible by examining him to know if
he has suffered this damage or where in the head it is.

9. Of these types of injury, both crush-injury, that which is not apparent
and that which somehow becomes evident, and fracture, that which is not ap-
parent and that which is evident, come to trephination. Also, if, in the case of
a weapon *hedrē* occurring in the bone, fracture and crush-injury accompany
the *hedrē*, or if crush-injury alone, without fracture, accompanies the *hedrē*,
this case too comes to trephination.But of the cases in which the skull is 2

crushed in, out of its normal position, only a few require trephination, and those that are the most crushed-in and most severely fractured need trephination least. Nor does *hedrē*, in and of itself, without fracture and crush-injury, require trephination, not even if the cleft is large and broad; for cleft and *hedrē* are the same.

10. First it is necessary to inspect the wounded person to see where the head wound is, whether in the stronger parts or in the weaker, and to examine closely the hair around the site of injury to see if it has been severed by the weapon and if it went into the wound; if this is the case, state it is likely that the bone is stripped bare of flesh and the bone has sustained some sort of injury from the weapon.These things should be said while you observe at a 2
distance, not touching the patient; but then, touching the patient, try to make sure if the bone is bare of flesh or not. And if the bone is bare and clearly visible to the eyes, (well and good); but if not, examine it with the probe. And if you find the bone bare of flesh and unsound as a result of the injury, you must first diagnose the condition of the bone, seeing how great the damage is and what sort of treatment is required.You should also ask the injured 3
person how he sustained the injury and in what manner it occurred. And if the bone is not visible, to show if it has any damage or not, then it is much more necessary, than when the bone is bare, to inquire how he sustained the injury and in what manner it occurred. For, in the case of crush-injuries and fractures that are not apparent in the bone but are there, you should try first to discern from the patient's reply if the bone has suffered any of these or not. And then prove your diagnosis by reasoning and by examination, short of probing. For probing does not prove if the bone has suffered, and contains within it, any damage of these sorts or not.Probing does, however, prove the 4
existence of a weapon hedrē and whether the bone is crushed in, displaced from its normal position, and whether it is severely fractured, conditions which are also clearly apparent to the eyes on inspection.

11. The bone is fractured, sustaining either fractures difficult to see or

those readily visible, and is crushed, sustaining crush-injuries difficult to see, and also is crushed in, out of its normal shape (in the following circumstances): when a person is deliberately wounded by another who intends to wound him, rather than when he is wounded unintentionally; when the cast or strike, whichever it may be, is from above, rather than when it is from level ground; and if a man has good control of the weapon with his hand, whether he cast it or strike with it; and if a stronger man wounds a weaker.With regard to 2
those who, by falling, sustain injuries extending to the skull and involving the skull itself, he who falls from a great height and onto something very hard and blunt is in danger of fracturing his skull, crushing it or crushing it in, out of its normal position. But in the case of someone who falls from more level ground and onto something rather soft, his skull suffers these injuries less or may not suffer them at all.With regard to missiles that fall on the head, in- 3
flicting wounds which extend to the bone and involve the bone itself, that missile falling from the greatest height, farthest from (the victim's) level, and one that is very hard, and, at the same time, very blunt and very heavy, i.e., least light, sharp, and soft, is the one that will fracture the bone and crush it. And the bone is particularly apt to suffer these injuries when these circum- 4
stances occur and when the blow is straight and the bone is in the direct line of the weapon, whether it is wielded by hand, or thrown, or whether something falls on the person, or he is wounded by falling down or wounded in any way whatever, provided the bone is in the direct line of the weapon. But those weapons which strike the bone obliquely are less apt to fracture, 5
crush, or crush in the bone, even if the bone is stripped of flesh. And in the case of some of the wounds inflicted in this way, the bone is not even stripped of flesh. Those weapons that are especially apt to fracture the bone, causing ei- 6
ther readily visible fractures or those difficult to see, and also to crush it and to crush it in, out of its normal position, are curved, round, smooth-tipped, and, at the same time, blunt, heavy and hard. These (weapons) also crush the flesh and macerate and pound it. And wounds from such weapons become somewhat sunken, to one side or all around, and are also more apt to suppurate, and they are moist, and take longer to become clean. For the crushed

and pounded flesh must become pus and melt away.Elongated weapons, be- 7
ing for the most part slender, sharp and light, cut through the flesh rather than crush it, and do the same to the bone. The weapon produces a *hedrē*, and it does this by cleaving through it – for a cleft and a *hedrē* are the same thing – but such weapons do not actually crush the bone or break it or crush it in out of its normal position.

So, in addition to your visual inspection of what may be seen in the 8
bone, you must also inquire about all these matters – for these are indications of a patient's being injured to a greater or lesser extent – and (inquire) whether the patient was stunned and darkness poured over him and whether he had vertigo and fell down.

12. When it happens that the skull is stripped bare of flesh by the weapon and that the wound occurs in the region of the sutures themselves, it is difficult to make out the weapon *hedrē*, which would be obvious elsewhere in the skull, and (to know) whether it is present in the bone or not, especially if the *hedrē* happens to be in the sutures themselves. For the suture itself, being rougher than the rest of the bone, is deceptive, and it is not at all clear what here is suture and what is weapon *hedrē*, unless the *hedrē* is very large. And fracture, too, commonly accompanies that *hedrē* which occurs in the su- 2
tures, and the fracture itself is more difficult to make out, even though the bone is broken, for the reason that, if there is a fracture, in most cases it occurs in the suture itself. For in this spot the skull is prone to break and come apart due to the natural weakness of the bone there and to its looseness, and especially to the fact that the suture is prone to break and come apart. But the rest of the bone, that surrounding the suture, remains unbroken because it is stronger than the suture.Fracture that occurs in the suture is also a separa- 3
tion of the suture, and is not easy to make out, neither when the fracture and separation occur as a result of a weapon *hedrē* situated in the suture, nor if the fracture and separation occur as a result of the skull's being crushed at the site of the sutures. But fracture from crush-injury is the more difficult to

diagnose. For the sutures themselves, appearing like fractures and being rougher than the rest of the bone, deceive the judgement and the eyesight of the doctor, unless the cleft and separation are marked – cleft and *hedrē* are the same thing.However, it is necessary, if the injury occurs in the region of 4
the sutures and the weapon comes to rest on the bone or in the bone, to pay close attention to discover what the bone has suffered. For when the weapons are equal, similar, or much less in size, the patient who receives (the force of) the weapon in the sutures, even when wounded to the same extent or much less, incurs greater damage to the skull by far than he who does not receive (the weapon's force) in the sutures. Most of these cases require trephining. However, you must not trephine the sutures themselves, but, keeping to one side, perform the trephination in the adjacent bone, if you do trephine.

13. Concerning treatment of head wounds and the means necessary to diagnose bone lesions that are not apparent, this is my opinion: A head wound should not be moistened with anything, not even wine, or, if at all, with the least amount; nor (should a head wound) receive a poultice or be treated with a lint dressing or be bandaged, unless the wound is on the forehead, in the area bare of hair, or in the region of the eyebrow and eye. Wounds occuring in these areas have a greater need of poulticing and bandaging than those elsewhere in the head; for the rest of the head surrounds the entire forehead, and from the surrounding areas the wounds, wherever they may be, become inflamed and swollen through an influx of blood.But even wounds on the 2
forehead should not be treated with poultices and bandages continuously, but when the inflammation stops and the swelling subsides, stop applying plasters and bandaging. But in the rest of the head a wound should not be treated with a lint dressing, or with poultices, or with bandaging, unless it also requires incision.

Wounds in the head and forehead should be incised wherever the bone 3
is bare of flesh and seems to have some damage from the weapon but the wounds are not sufficiently long or broad for inspection of the bone, to see if it suffered any damage from the weapon and what sort it suffered and to what extent the flesh has been crushed and the bone injured, or, on the other

hand, to see if the bone is uninjured by the weapon and has suffered no damage, and, with regard to treatment, to see what sort the wound requires, both for the flesh and the bony lesion. These are the sorts of wounds that require incision.When the bone is laid bare of flesh and there is marked undermin- 4
ing to one side, open up the undermined area by incision wherever it is not easy for the medicine, whichever you use, to reach. In the case of wounds which are circular and markedly undermined, open up such wounds by incising the circumference in two places lengthwise, as the person has grown, so making the wound a long one.

If one makes an incision in the head, the other parts of the head may be 5
incised with safety; but this part, the temple and the area above it in the region of the blood vessel which traverses the temple, should not be incised. For spasm then seizes the patient. And if the incision is made in the left temple, spasm seizes the right side (of the body), and if the incision is made in the right temple, spasm seizes the left side (of the body).

14. Therefore, when you incise a head wound because the bone is stripped bare of flesh and you wish to know if the bone has, or has not, sustained any damage from the weapon, you must make the incision of a size that seems sufficient. And, as you incise, you must lift the scalp away from the bone where it adheres to the membrane (pericranium) and the bone. Then pack the entire wound with lint dressing in order to keep the wound as wide as possible until the next day with the least pain. After packing (the wound) you must use as a poultice, for as long a time as the packing, a dough made of fine barley meal; knead it with vinegar and boil it and make it as glutinous as possible.

The next day, when you take out the packing and look to see what the 2
bone has suffered, if the type of bony injury is not apparent to you, and you cannot determine if the bone has anything wrong with it or not, but the weapon appears to have reached the bone and to have injured it, you should scrape down into the bone with a rasp, both longitudinally, as regards the growth of the patient, and transversely as well, in an effort to see fractures which are not apparent and any crush-injury which is not apparent because (the injured bone) is not crushed in, away from the normal position of the rest of the skull. For rasping effectively demonstrates the damage, if these le-

sions, although present in the bone, are not otherwise evident.And if you see 3
a weapon *hedrē* in the bone you should rasp the *hedrē* itself and the bone surrounding it to prevent the situation, which often happens, of fracture and crush-injury, or crush-injury alone, occurring in association with *hedrē*, and then, because they are not obvious, being overlooked.

When you scrape the bone with the rasp, if the bone injury appears to 4
require trephination, you must trephine and not exceed three days without trephination, but trephine within that time period, especially in hot weather, if you undertake the patient's care from the beginning.And if you suspect 5
that the bone has been fractured or has sustained a crush-injury or both these, taking as indications the fact that, from the patient's account, he has received a severe blow, and that the blow was administered by someone stronger, if it is a case of one person being wounded by another, and that the weapon with which he was wounded was of a sort to cause damage, and then that the patient experienced vertigo and darkening of vision and he was stunned and fell down, in these circumstances, if you cannot determine whether the bone has sustained a fracture or a crush-injury or both of these, and cannot, even in another way, by inspection, then you must pour onto the bone the very black solution and spread this dissolved black medication over the wound; then, after stretching linen as an under-dressing over the wound, and wetting it with oil, and then applying a barley-meal poultice, bandage it.The next day, after re- 6
moving (the dressing) and cleaning the wound, use the rasp. And if the bone is not healthy, but has sustained a fracture or crush-injury, the rest of the bone, after being rasped, will be white, but the fracture and the crush-injury, because the medication is dissolved, will have absorbed it and, because it is black, will be black in the otherwise white bone.You must then scrape fur- 7
ther toward the depth of this black-appearing fracture, and, if in rasping you remove the fracture and make it invisible, then there has been a crush-injury of the bone, more or less severe, and this caused the fracture, now obliterated by the rasp; but it will be less a cause for fear and less a matter of concern with the fracture obliterated.But if it goes deep and will not disappear with 8

rasping, at this point such a situation calls for trephination. And after trephining it is necessary to apply the remaining treatments for healing the wound.

15. Care must be taken that the bone not contract anything harmful from the flesh if it is improperly treated. For bone that is trephined or else untrephined but laid bare, whether it be sound or have some weapon damage and only appear sound, is at greater risk of suppuration, even if otherwise it would not occur, if the flesh surrounding the bone is improperly treated and becomes inflamed and contracts. For (the flesh) becomes feverish and full of inflammation, and then indeed from the surrounding flesh the bone draws into itself heat, inflammation, irritation and throbbing and however many harmful conditions the flesh has in it, and so from these becomes purulent.It is al- 2
so bad for the flesh in the wound to be moist and to ooze and to be a long time in becoming clean. Rather, the wound should be made to suppurate as quickly as possible. For thus the (flesh) surrounding the wound will be the least inflamed and (the wound) will most rapidly be clean; for the flesh that has been lacerated and crushed by the weapon must necessarily become purulent and melt away. And when the wound is cleansed, it must become drier. For thus, with dry flesh growing and not wet, the wound will very rapidly become healthy and so will not produce exuberant growth of flesh.The same 3
reasoning applies also to the membrane around the brain; for if you trephine through the bone straightaway, and remove it from the membrane, and thereby expose (the membrane) you must make it clean and dry as soon as possible, so that it does not, as a result of being moist a long while, begin to ooze and to be macerated; for in these circumstances there is a risk of its becoming putrid.

16. Any bone that is sure to separate from the rest of the bone when a wound has occurred in the head and there is a weapon *hedrē* in the bone, or when the bone has been extensively exposed in some other fashion, generally separates after becoming bloodless. For the blood in the bone is dried up both by time and by most medications.And (the bone) will separate most rapidly 2
if the wound is cleaned as soon as possible and after that if both the wound and the bone are made dry, whether (the area of bone affected be) larger or smaller. For that bone which has been most rapidly rendered dry and has be-

come like a potsherd, separates most readily from the rest of the bone, which contains blood and is living. But bone that, on its own, has become bloodless and dry in the midst of living bone with good blood supply (also) separates readily.

17. Cases in which the bones are crushed in, out of their normal position, and are comminuted or severed with very wide separation are less dangerous, as long as the membrane is intact. And, in cases of depressed, comminuted fracture, the greater the number of fractures and the wider their separation, the less dangerous they are and the more easily they lend themselves to removal. It is not necessary to trephine any such cases or to risk trying to extract the fragments of bone before they rise up on their own . . .They 2
come up when flesh grows below them, and it grows up from the diploe of the bone and from the healthy (bone) if the upper table alone of the bone is necrotic. And in this way the flesh will grow from below and burgeon and the bone fragments rise most rapidly if the wound is brought as rapidly as possible to suppuration and made clean.And if the entire thickness of the 3
skull, with both its tables, outer and inner, is crushed in, onto the membrane, it is by this same treatment that the wound will heal quickest and the bone fragments that are crushed in will rise most rapidly.

18. The bones of young children are thinner and softer for this reason, that they contain more blood and are hollow and porous and neither dense nor hard. And in cases where the patients are wounded by weapons capable of equal or less damage and (are wounded) to the same extent or less, the (bone) of the younger child suppurates to a greater extent and more rapidly than that of the older and for a shorter time; and of those who are destined, in any case, to die of the wound, the younger perishes sooner than the older.

But, if the bone is laid bare of flesh, you must apply your mind to try to 2
discern what is impossible for the eyes to see and to determine whether the bone has been fractured and crushed or only crushed, and whether, if a weapon *hedrē* is present, there is also crush-injury or fracture or both of these. And if the bone has suffered any of these (injuries), let blood escape by per- 3
forating the bone with a small perforator, taking care (to check) at short intervals, for the skull of young people is thinner and has less depth than that of older persons.

19. When a patient is likely to die from his head wounds and cannot recover his health or be saved, it is by means of the following signs that you must make the diagnosis that he is going to die and predict what is going to be.For (the patient) suffers the following: when, after recognizing that the 2

bone has been injured, either broken or crushed or at any rate in some manner injured, (the doctor) errs and neither scrapes nor trephines ... as if the bone were sound, fever will, as a rule, seize the patient within fourteen days in winter, and in summer fever seizes him after seven days. And when this occurs the wound becomes discolored and a small amount of serous discharge flows from it and the inflamed tissue dies out of it and it becomes glutinous and looks like salted fish, its color a livid red. Then the bone begins to necrose, and, while remaining smooth, it becomes dark-colored and finally turns entirely pale yellow or off-white.But when it has begun to suppurate, blisters 3
occur on the tongue and the patient dies delirious. And in most cases convulsion seizes the parts of the other side of the body: If the wound is on the left side of the head, convulsion seizes the right side of the body, and if the wound is on the right side of the head, convulsion seizes the left side of the body. There are some patients who also become apoplectic, and in this condition they die within seven days in summer or fourteen in winter. These signs have the same meaning, both in the older patient and in the younger.So if 4
you observe that fever is seizing (the patient) and that any of these other signs accompanies it, do not waste time, but trephine the bone down to the membrane or scrape down with the rasp – the bone becomes brittle and easy to abrade – and then manage the rest of the medical treatment in a manner that seems appropriate in view of the circumstances.

20. When, in the case of a head wound in which the patient has or has not been trephined but the bone is denuded, there occurs a red, erysipelas-like swelling of the face and one or both eyes – and the swelling may well be painful when touched –, and fever seizes (the patient), and chills, but the

wound itself, as regards both flesh and bone, appears healthy and the tissues around the wound are healthy, except for the swelling of the face, and the swelling has not been complicated by any other error in the rest of (the patient's) regimen, in this case you should purge the bowel with a medicine to draw off bile.After (the patient) has been purged in this way the fever re- 2
leases its hold and the swelling subsides and the patient gets well. But this medicine must be given with an eye to the patient's vigor, to the strength he has.

21. Concerning trephination, when necessity compels you to trephine a patient, here is what you must know: if you trephine, having undertaken (the patient's) care from the beginning, you should not excise the bone down to the membrane straightaway. For it is not good for the membrane to be bare of bone and subject to damaging exposure for a long time; otherwise it may finally become macerated. And there is also another danger, that, if you trephine down to the membrane and at once remove the bone, you may, in the procedure, damage the membrane with the trephine.Rather, during trephina- 2
tion, when the bone lacks a very little of being sawn through and can already be moved, you should stop trephining and let the bone separate on its own. For in the case of bone which is sawn through but lacks some trephining no harm will occur, since the bone left (undivided) is now thin. The rest of the treatment should be that which seems appropriate to the wound.

When trephining it is necessary to remove the trephine frequently on ac- 3
count of the heat transmitted to the bone and to dip it in cold water. For the trephine, heated by rotation, in turn, by heating and drying the bone, scorches it and causes more of the bone surrounding the trephination site to separate than would normally do so. If you want to trephine down to the membrane immediately, and then remove the bone, you must, in the same way, take the trephine out frequently and dip it in cold water.

If you do not take on (the patient's) care from the beginning, but receive 4
it from another (physician) and so are behind schedule in the medical treatment, then, with a sharp-toothed trephine, you must immediately saw through the bone down to the membrane, but frequently removing the trephine to inspect, with the probe as well as in other ways, around the path of the trephine. For the bone is much more rapidly sawn through if you operate when it has already begun to suppurate and is purulent through and through.And it 5
often happens that the skull has little depth, especially if the wound is in that part of the head where the bone is more thin than thick. But you must guard against careless application of the trephine, and always fix the trephine firmly in the bone at the site where the bone seems thickest, inspecting it frequently, and try, by rocking it back and forth, to lift the bone out; once the

bone is removed, administer the rest of the medical treatment as seems appropriate to the wound in view of the circumstances.

If you take on the medical care (of the case) from the beginning and 6
want to trephine through the bone immediately and to remove it from the membrane, then in the same way you must frequently examine the circular course of the trephine with the probe and always fix the trephine in the thickest part of the bone and use back-and-forth movements in an attempt to remove the bone.But if you use a perforator, do not penetrate through to the 7
membrane, in case you take on the medical care from the beginning and you do use a perforator, but leave intact a thin layer of bone, as has been written in regard to trephining.—