Have the will, I repeat, and you will soon help science; to which I might add, that you would also do much for your own personal success, if I did not dislike appealing to selfish motives. Indeed, the difficulty is not what to do or how to do. It is that the mine is so rich, so attractive on all sides, on every point, that it is difficult not to spend time, one day in one field, the next in another; and, from lack of concentration of efforts, to fail to produce any very great work.

Now, gentlemen, in concluding this address, I feel that I must apologise for having carried you through such a long array of arguments, and I give you my best thanks for having listened so attentively to my remarks.

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ON
**SHOCK AFTER SURGICAL OPERATIONS
AND INJURIES.***

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THE PHYSIOLOGICAL AND PATHOLOGICAL EXAMINATION OF THE SYMPTOMS OF SHOCK.

THIS requires consideration, not only because of its intrinsic importance and interest, but because also this part of our subject will furnish the most philosophical data for treatment.

Dynamical pathology can scarcely be said to exist at present. The reason is to be found in the still early state of our knowledge of dynamics as applied to physiology. Reference has already been made to the question of the correlation of the nerve to other physiological and even physical forces; and the present state of our knowledge of this subject scarcely justifies more than an allusion to its great importance. It is common, and certainly convenient, to speak of a "depression of nerve-force". Strictly speaking, however, no force can be depressed; it can only be metamorphosed into some other of the numerous forces which prevail, or are capable of prevailing, in the animal economy. A more specific definition, then, of shock is, that it is essentially a metamorphosis of nerve-force. It will, nevertheless, be convenient still to speak of the depression or impairment of nerve-force, using the expression in a general sense.

Unconsciousness, complete or incomplete, is due to the injury which acts directly on the nervous system; and the more direct the injury, the more complete will unconsciousness be. It may also be augmented, or protracted, or even induced, by enfeebled action of the heart, which fails to send arterial blood to the nerve-centres in quantities sufficient to keep up that unceasing nutrition which is essential to the continued exercise of the nerve-function.

Muscular Inaction is due chiefly to the state of

the nervous system. The will, the emotions, and sensation, are all too much in abeyance to call forth a direct muscular action. Muscular contractility also requires the constant and plentiful supply of arterial blood; and, if this be altogether absent, nerve-stimulation itself is incapable of exciting contraction. In ordinary shock, there is simply diminished—it may be greatly diminished—supply of arterial blood. The complete absence of arterial blood could only occur where shock was about to terminate in death.

Impaired tonicity, and still more paralysis of the muscular system, gives rise to many symptoms, such as an inability to maintain the erect posture, the falling of the upper lid, and others; one only of which requires further consideration at present, and that is the failure of contractility in the sphincters. It is common in text-books to find spontaneous evacuation of the fæces and retention of urine described as indications of shock, as well also as of other lesions of the cerebro-spinal system. The reason of the evacuation of fæces, in the case of the rectum, and of the retention of urine, in the case of the bladder, has given rise to considerable discussion; and no interpretation of these phenomena has yet been given which is generally accepted. I have, within the last few years, in a note to an article in one of our principal journals, given an explanation which I shall repeat here, and which I cannot but regard as a correct and sufficient explanation.

Let me first observe, that spontaneous evacuation of the fæces, even in the severest cases of shock, is not a constant symptom; and, when it is not present, there is usually constipation of more or fewer days, according to the intensity of the shock and the mode of treatment adopted. In the severer forms of shock, retention of urine is invariably present. The explanation I offer, putting it as concisely as I can, is this. When the rectum is loaded, it requires more muscular power to retain than to expel its contents. When, on the contrary, the bladder is full, more force is requisite to expel than to retain its contents. It is only when the rectum is full, that the fæces are spontaneously evacuated in shock. The vertical position of this part of the large intestine, and the dependent position and large size of its aperture, combined with the weight of the viscera above, are sufficient to permit the fæcal accumulation to pass, if the contractility of the sphincter be lost or seriously impaired. With the bladder it is quite otherwise. Here the expulsive must overcome the retentive power, in order that urine may pass; and may be explained chiefly by the different relative disposition and strength of the muscles of retention and expulsion in the two organs, as well also by the smaller opening of the urethra, its less dependent position, and the longer and more tortuous character of the excretory canal. When the bladder is distended to its utmost, assuming that muscular contractility is not recovered, the urethra itself is gradually opened and distended; and thus, quite from mechanical causes, the urine commences to dribble away. The urine also continues to dribble away, at least as much as is secreted in excess of the capacity of the bladder when fully distended. It is not correct, as Mr. Henry Thompson has pointed out, to call this condition incontinence; it is really "overflow"—the engorgement of the French.

* Continued from page 244 of JOURNAL for March 2nd.

THE ACTION OF THE HEART IN SHOCK.

No principle in physiology is more certain than that the heart's action is not necessarily dependent on the influence of nerve-force, as proved by the fact that the heart beats in the foetus before the nerve-centres are developed, by the existence of anencephaloid monsters, by experiments on animals consisting in the careful and gradual removal of the cerebro-spinal system, and by the contraction of the heart when removed from the body. At the same time, a principle of equal importance is this—that the action of the heart is susceptible of great modification, and even arrest, by means of influences conveyed through the nervous system. Its movements are regulated through the medium of the pneumogastric, spinal, and sympathetic nerves; and the experiments of Von Bezold, Weber, Budge, Schiff, and others, justify the conclusion that shock may be communicated to it through either the cerebro-spinal or sympathetic systems. The physiological action of the pneumogastric seems to be, most singularly, to retard or inhibit cardiac action, and thus to oppose the influence of the ganglionic and spinal nerve-stimuli. Experiment shows that the sympathetic stimulates the heart to increased action; while interrupted galvanic currents along the pneumogastric nerve, as Weber showed, arrest the heart's action. The bearing of the latter fact on death from blows on the epigastrium I have already referred to. The effects of shock may be conveyed through the medium of the cerebro-spinal system to the sympathetic, and also through the sympathetic to the cerebro-spinal.

I have already stated that the action of the heart in pure shock is retarded, the number of beats per minute being diminished. There is good reason to consider that the accelerated action of the heart, which is commonly regarded as a symptom of shock, is really a sign of reaction, however early it may set in; and reaction is properly recognised by the increasing acceleration of the heart's action—the degree of reaction also corresponding to the degree of accelerated cardiac contraction. It is quite true that reaction may commence in the heart, and yet be long delayed in its other manifestations. For a longer or shorter time, the contractions of the heart, although increased in frequency, are insufficient fully to supply the nervous centres. Here, however, I am chiefly desirous of drawing attention to the slowness of the pulse as the immediate result of a severe accident. I ascertained this in the following cases, in which I made a special examination of the heart's action: a case where the upper extremity was greatly lacerated, and torn off at the shoulder-joint; three cases in which the lower limb, including the knee, was crushed so as to require amputation; one case where the leg was crushed by the passage over it of a railway truck; twenty-six cases of strangulated hernia; nine cases of concussion of the brain, with unconsciousness (in the latter two classes of cases, the slower action of the heart is unusually prolonged); in five cases of fracture of the skull; and in two cases of severe injury to the abdomen. Sooner or later—in some cases remarkably soon, in others not for hours or days—the pulse gradually succeeds in the attempt to compensate for its weakness by increase of action.

In operations for inflammatory disease, or for injury of some duration, the pulse being already acce-

lerated, the diminished frequency of the pulse is only relative, and may be very slight and of brief duration; but the greater and more sudden the shock, the more marked will it be. Where degeneration or other pathological change has taken place in the muscular structure of the heart, the influence of shock is much more intense in proportion to the severity of the injury, and is also much more frequently fatal.

I may mention here another sign of reaction, which is not infrequently described as one of the phenomena of shock; namely, vomiting. I have never known vomiting to occur (except in strangulated hernia, when the vomiting has a mechanical cause), unless the pulse was accelerated, and some heat of the skin was present. And yet vomiting may unquestionably occur at an early period after shock.

EFFECTS OF DIMINISHED CIRCULATION.

The effects of enfeebled circulation are numerous and palpable; as, for instance, the tallowy pallor of the skin; the peculiar whiteness of the lips (which is probably due to the absence of the rete Malpighii, with its pigmentary cells, in mucous membrane); the coldness, subjective and objective; the want of lustre in the conjunctiva of the cornea and sclerotic; the contraction of the features; and the dilated character of the nostrils. The shallow, irregular nature of the respiratory action is also due in part to the impaired muscular power of the heart, but in part also to the direct influence which is exerted upon the respiratory functions, as well as upon the circulatory, through the medium of the nervous system. An important feature of the respiration is its extreme irregularity, especially in the deeper inspirations, which occur naturally about every fifth inspiration. But the chief peculiarity in the respiration is the loss of the relative proportion in the frequency of the pulse and the respiratory acts. A glance at the cases, tabulated for the purpose of showing the relation of the temperature of the body to shock, shows this very clearly. The pulse may even increase in frequency; and the respiratory acts become slower at the same time, or the reverse may occur. This peculiarity runs more or less conspicuously through the fever of reaction, affording another point of difference between the fever of reaction and the ordinary "medical" fevers.

The cold "clammy" perspiration so often perceptible on the skin is mostly found in those cases where psychical causes have played an important part in the production of shock, and in cases where the injury has occurred to a person engaged in bodily exertion. It is improbable that the perspiration is secreted at the time the system is suffering from shock, because of the diminished circulation in the perspiratory glands, and the diminished activity of secreting cells generally, which accompany that condition. It is most likely due to the relaxation of the ducts from diminished vascular supply and the impaired contractility of the smooth muscular fibres of the skin, which permit the perspiratory fluid to escape upon the surface of the skin. Such perspiration is never abundant or persistent in its appearance.

The blueness of the nose and fingers in cases of shock, and especially in that peculiar form of shock which results from the application of cold to all the

structures, is for the first time satisfactorily explained by the experiments of Dr. Norris, as described in his paper on "Stasis", which appears in a recent volume of the *Transactions* of the Royal Society. He has observed that, in experiments in which spasmodic contraction of the smaller arteries took place, there was a reverse current into the capillaries from the veins, which continued until the capillaries were full. The capillaries remained full permanently, or until the relaxation of the artery again permitted arterial blood to be propelled through it. When cold is applied to the surface, the arteries are contracted by its influence; and the capillaries are filled with venous blood, which is returned from the veins. It is the presence of venous blood in the capillaries which gives rise to the blue appearance referred to. There is no doubt that the colour of the skin, whatever it may be as regards the different shades of pallor, redness, and blueness, is due to the condition of the capillaries mainly, and very slightly to the condition of the larger vascular trunks.

REACTION FROM SHOCK.

Reaction is a condition following those cases of shock which do not prove quickly or immediately fatal, and has many and varying characters as regards its phenomena and the time at which they make their appearance. When the injury and the resulting shock are slight, the reaction follows quickly, and consists of little more than a return to the natural, or a near approximation to the natural, state of the several organs and their functions. In these cases, there is commonly some acceleration of the heart's action, some flush of the skin, and some diminution in the distinctness and vigour of the mental power. In other cases of slight injury, but considerable shock, there may be smart febrile reaction. Every one is familiar with the sensation of shock from sudden mental emotion, as in witnessing some great danger or accident to human life—the momentary confusion of thought and feebleness of the heart's action, followed immediately, so rapid is reaction in these cases, by palpitation, hot skin, and perspiration. The act of blushing is probably rapid reaction from mental shock more or less severe. Our knowledge of the fever, its nature, and the time of its accession and duration, which follows severe mental shock, is very imperfect; but we cannot doubt that, as in shock, there is some physical change in the nervous and other structures (although much of the change in nervous structures, but certainly not all, may be of a dynamical character), so in reaction there is also some further change in the affected parts of the organisation which, in favourable cases, terminates in a state of health.

In more marked shock, but not that of the severest injuries, the fever is very obvious. The pulse and respiration are accelerated, the skin is hot, the secretions are scanty and deficient in water; thirst and headache are also present. Vomiting* occurs at an early period in reaction. In such cases, the fever of reaction comes on quickly, and, as a rule, quickly subsides.

In the severest injuries, which are yet not fatal, there are two classes of reaction from shock. First, those where the fever is long deferred, or slightly

marked, or too transient, and where exhaustion and a fatal termination are very likely to ensue. In the other class, reaction comes on within a few hours, speedily becomes very marked in its phenomena. The frequency of the cardiac and respiratory actions is extreme. Thirst and the other phenomena of fever are all present in an exaggerated degree. Vomiting may occur, or delirium, or a too acute sensitiveness of the special senses. The thermometer placed in the axilla will rise to 103° or 104° (Fahr.) If a trace be taken of the pulse by means of the sphygmograph, the line of descent will be more or less concave, and the diastole especially marked. In the majority of cases, these apparently alarming symptoms gradually subside, and the case progresses to a favourable termination. In the severer cases, the fever is probably dependent, partly on the local injury and subsequent local inflammation, and also, it may be, dependent on the blood itself, which has been altered by shock, and (bearing in mind Dr. Parkes's views) altered possibly in its albuminous constituents.

Reaction occasionally increases the effect of the prior injury by inducing extravasation of blood from vessels which did not bleed so long as shock only was present. This result is mostly seen, and, unfortunately, is most disastrous, in injuries of the head. When the middle meningeal artery is torn in fracture of the skull, hæmorrhage comes on with reaction to so great an extent as to constitute, from the pressure of the clot, a frequent cause of death.*

MODES OF DEATH IN SHOCK.

The great majority of cases of death from shock may be attributed to syncope and asthenia. Of deaths from syncope, there are two kinds. In one, there is a sudden and extreme spasmodic contraction of the heart, which leaves it empty or nearly empty, and which is not followed by relaxation. These cases appear to result from a sudden and violent impression on the nervous system. The subject of such a form of shock is pale, unconscious, muscularly powerless, and dead in a moment, and almost simultaneously. Very much more frequently, the cause of fatal syncope is the sudden cessation of the contractility of the muscular fibre of the heart. Death occurs in this manner, in most cases of syncope, from the several varieties of injury or from loss of blood. It may be sudden (the first variety of syncope is invariably sudden) or gradual, as in by far the greater number of injuries where, when death is not immediate, it is often said to be by asthenia. The cavities of the heart contain more or less blood, but not firmly coagulated.

In shock, the result of severe injury to the nerve-centres or to the peripheral nervous expansion, death is mainly due to influences transmitted to the heart; but it must not be overlooked that similar influences act directly upon, and enfeeble or arrest, the respiratory function.

There is a mode of death from shock following exposure to cold, which not only differs from all other modes of death from shock, but differs from all other modes of death from any cause whatever. When the influence of cold is sudden and severe, the result is coma; but it is much more frequently

* I have often seen a desire on the part of surgeons to attribute, very unjustly, the vomiting of reaction to the influence of chloroform.

* For this condition, when in progress, and permitting diagnosis, as it often does, I have proposed (*Medical Times and Gazette*) to ligature the common carotid.

the case that death occurs from shock, the result of exposure to gradually increasing cold, which acts on all the organs and tissues, and depresses directly the vitality of all. A man was brought into hospital who had been exposed to cold the whole night. There was universal but peculiar bluish pallor, with blueness of the nose, ears, and extremities. There was complete unconsciousness and inactivity of the muscular power. The heart's action was scarcely perceptible and very slow, and there was no pulsation in the extremities. The breathing, too, unlike the breathing of coma, and irregular sighing respiration of shock through the medium of the nervous system, was regular, but extremely feeble and slow. In such a case as this, it is not the nervous system which secondarily affects the heart, nor the heart which affects the nervous, respiratory, and other organs, but all by the same agency are equally reduced to torpor, inaction, and, unless timely treatment be resorted to, death.

It is a singular feature of death from violent impressions on the nervous system, that somatic death, or the cessation of circulation and respiration, is simultaneous with molecular death. Thus, while in death from other causes molecular death is delayed for some time, as indicated by the contractility of the muscular tissue on the application of the electric stimulus, in death from shock, acting through the medium of the nervous system, the irritability of the muscular fibre ceases with the cessation of the circulation and respiration, and the chemical forces at once assume that activity which, in other cases, comes into operation at a later period. This peculiar simultaneity of somatic and molecular death, and the more rapid accession of decomposition, illustrate most forcibly the potent effects of violent impressions on the nervous apparatus.

It is doubtful whether the mode of death from necræmia does not occur at a period later than that which can definitely be called the period of shock. It includes those deaths which result from an altered state of the blood, and has been sufficiently referred to in the observations already made on pyæmia and other ulterior effects of shock.

The annals of physiology and pathology do not contain anything more remarkable or startling than the records of cases where individuals have been able to voluntarily assume a condition which, in appearance, is difficult to distinguish from death-like collapse or death itself. The works of Dr. Cheyne, Dr. Carpenter, and Mr. Braid (*Observations on Trance, or Human Hybernation*, 1850), contain almost marvellous statements on this question. Dr. Carpenter, after speaking of the power of voluntary syncope, which, let me observe, may be regarded as shock caused by the will, remarks:

"The best authenticated case of this kind is that of Colonel Townsend, which was described by Dr. George Cheyne, who was himself the witness of the fact. But statements have been recently made respecting the performances of certain Indian Fakeers, which are far more extraordinary; it being demonstrated, if these assertions are to be credited, that the human organism may not only be voluntarily reduced to a state resembling profound collapse, in which there appears to be a nearly complete suspension of all its vital operations, but may continue in that condition for some days, or even weeks, until, in fact, means are taken to produce resuscitation.

Another form of apparent death, the existence of which appears to be well authenticated, is that sometimes designated as 'trance' or 'catalepsy', in which there is a reduction of all the organic functions to an extremely low ebb, but in which consciousness is still preserved, whilst the power of voluntary movement is suspended.

"It is impossible, in the present state of our knowledge, to give any satisfactory account of these states; but some light appears to be thrown upon them by certain phenomena of artificial somnambulism, 'hypnotic' or 'mesmeric'; for, in this condition, there is sometimes an extraordinary retardation of the respiratory movements and of the pulsations of the heart, which, if carried further, would produce a state of complete collapse; and its self-induction is suspected by Mr. Braid to be the secret of the performance of the Indian Fakeers just referred to."

In a note touching Mr. Braid's cases, Dr. Carpenter says:

"In one of these vouched for by Sir Claude M. Wade, formerly political agent at the court of Runjeet Singh, the Fakeer was buried in an underground cell, under strict guardianship, for six weeks. The body had been twice dug up by Runjeet Singh during the period of interment, and had been found in the same position as when first buried."

A man, who had been buried ten days, assured Lieutenant Boileau that he was ready to be interred for twelve months if desired.

"The appearance of the body when first disinterred, is described in all instances as having been quite corpse-like, and no pulsation could be detected at the heart or in the arteries."

The means of restoration were chiefly warmth to the vertex and friction to the body and limbs. Dr. Carpenter justly observes, that the warmth of the tropical atmosphere and soil would prevent that loss of heat which would otherwise be fatal.

THE PATHOLOGICAL APPEARANCES IN CASES OF DEATH FROM SHOCK,

Which are obvious to the unassisted eye, may be due to the injury which preceded the shock, or possibly to the shock itself—in many cases we cannot tell which. Of the changes which occur in the intimate structure of the nervous apparatus, we have no certain knowledge, and consequently not infrequently in cases of death, especially from the operation of psychical causes, no lesion can be detected after death. It by no means follows, with our imperfect means of observation and research, that we are justified in concluding that no change has taken place. Dr. Carpenter remarks, and it is difficult to see how any other opinion can be entertained, that there is no kind of death which leaves the animal organisation unchanged. I have already had occasion to refer to this subject. I may add, however, that the effects usually attributed to shock which are detectable demonstrate how powerful the effects of shock may be. A current of electricity passed through an egg in process of development ruptures the vessels in the vascular area. A similar current passed through a snail coagulates its albumen. We have experimental proof that violent impressions conveyed through the medium of the nervous apparatus give rise to chemical change; and it cannot be doubted that less violent impressions give rise to proportionally less marked change. The character

of the force, of which a given material substratum is the medium, is most directly and absolutely determined by the physical condition of such substratum. When the manifestation of force is similar to any given prior force, the character of the material instrument is also similar; if the manifestation of force be changed, there is also undoubted change in the material substratum. An exposition of the nature of such changes in the nervous system belongs to the future—if, indeed, it ever be possible.

[To be continued.]

CASE OF PRURIGO ALTERNATING WITH MELANCHOLIA.

By C. HANDFIELD JONES, M.B., F.R.S.,
Physician to St. Mary's Hospital.

A CLERGYMAN, aged 64, had an attack of melancholia about 1850, which lasted two years, leaving him quite well. When seen in October 1859, he stated that he had had varicose veins in the left leg for a long time, which on one occasion gave rise to troublesome rash and itching. The use of a bandage and aperients had kept him from suffering any annoyance from them for some years. At this date there was a threatening of a renewal of pain and itching near the left ankle; the veins were enlarged. His health was good. After a few weeks, one or two small ulcers formed; from these a blush of erythema radiated, accompanied by much itching. In spite of the best devised management, the itching, clearly of a pruriginous character, increased in extent and severity. About the end of the year, his condition was really distressing. The itching he described as intolerable, precluding sleep, or rest of mind or body. The surface of the whole leg was bright red, and covered with a very thin cuticle, through which innumerable papulæ could be seen; but there was no raw discharging part, save two little ulcers. The only relief obtained was from keeping the leg enveloped in lint soaked in strong infusion of tobacco, with the addition sometimes of powdered opium, sometimes of a large proportion of hydrocyanic acid. Latterly, faintness after eating came on. The mind all the time was perfectly sound. On morning early in February, a hasty message was brought, that Mr. — had gone out of his senses. When Dr. Palmer visited him, he found him wildly excited, and irrational in his talk; but the prurigo was gone. The previous evening, he had been itching as usual; this morning, the skin was only a little red, and he said it was quite well. He gradually became melancholic, and has so remained to the present day (November 1865). The prurigo has never returned.

For this case, as for several others of much interest, I am indebted to the kind thought and acute observation of Dr. Palmer, who, amid the pressing calls of a large practice, contrives to find time to preserve records of noteworthy cases. *O si sic omnes!* Believing, as Romberg does, that prurigo is essentially an hyperæsthesia of cutaneous nerves, I regard its alternation with melancholia as an occurrence of the same kind as the shifting of a neuralgia from one part to another; the only difference being, that a nervous centre is substituted for a nerve-tract. In my work on *Functional Nerve-Disorders*, I have recorded an instance in which severe facial neuralgia, as it gave way to quinine, was replaced

by periodical attacks of hysteria, lasting about two hours. Whether, in the above instance, any *materies morbi*, such as the gouty, existed, and underwent metastasis from the peripheral parts to the central, I have no evidence to show. However, I do not think that in either lichen or prurigo we have much ground for believing that the malady is dependent on any blood-poison. It seems to be of importance to have a clear conception of the possibility of nervous centres suffering in a quite analogous way to nerves, as the mind is thereby taken off from perpetually recurring, in all cases of cerebral disorder, to the notions of congestion and effusion, as it is so prone to do.

ON THE MODERN TREATMENT OF FRACTURES OF THE LOWER JAW.*

By BERKELEY HILL, F.R.C.S.,

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in the application of Surgical Apparatus in
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IN the *New York Medical Journal* for September and October, 1866, Mr. Gunning, of that city, has published an excellent paper on a mode of applying caps fitted to the teeth for fracture of the jaw-bone. By this method, external support is abandoned wherever it is possible. In the majority of cases of simple fractures, the caps or interdental splints are so accurately fitted as to require no fastening to the teeth; but, when the displacement is considerable, he supports the fragments in the splint by screwing the one or more teeth to the splint.

Mr. Gunning recommends that the jaw should be adjusted in its splint as quickly as possible; but he procured union in one case, which is narrated at length, where four months of ineffectual treatment had been previously tried, and fragments of bone were escaping through wounds under the jaw, with copious discharge of pus. His mode of proceeding is as follows. He first brings the fragments as much on a level and into their true position as possible. For this purpose, if his fingers do not suffice, he uses wooden levers or a small screwjack placed in the floor of the mouth, to force out obstinate deviation of a fragment inwards. Gaps, through loss of teeth at the line of fracture, are to be filled by plugs of hard wood, and the fragments kept in place by tightly wiring the teeth. It is best to remove all these means for keeping the fragments in place while the splint is being fitted, when that is accomplished, though ligatures used solely to support loosened teeth may be left, as there is no traction upon them. Stumps and teeth, loose before the accident, are best taken out, if they interfere with the arrangement of the splint.

Having done this, Mr. Gunning takes a mould of the lower jaw in wax softened by heat, holding the wax in an ordinary dentist's tray. From this mould he makes a plaster cast of the jaw. If the line of teeth be uneven in the cast, he saws it through, raises the pieces to the right level, and casts again. In this way he obtains an exact copy of the jaw in its natural position; on this he makes a vulcanite mould, which fits the teeth exactly. (Fig. 4.) The margins of the mould or splint should be carried down below the line of the gums, so as to grasp

* Concluded from page 226 of last number.