because of its pressure in front on the abdominal viscera in the false pelvis, and behind on the posterior supra-iliac spine. Now, in the place of making extension upon both legs which is here advocated, the point of counter-extension is placed in the centre of gravity of the trunk opposite the extremity of the ensiform cartilage, and this inertia or weight of the trunk is brought to bear by raising the bed-foot upon blocks of wood or bricks. These I have frequently supplemented by shoulder-straps, with axillary pads fixed to the rail at the head of the bed, with the addition sometimes of a chin-strap having the same attachment. These I have used, however, more frequently in cases of spinal disease or injury higher up in the trunk, thereby shifting upwards the point of counter-extension.

In cases of disease of the upper lumbar or lower dorsal vertebra, or their joints, I believe that I have secured considerable benefit to the patient by the adoption of double extension, combined with aspiration of the abscesses which form, frequently leaving persistent sinuses, which usually go on from bad to worse, and too often cause despair to the surgeon, and inevitable death to the patient. In such cases, persistent extension in the recumbent posture has, as far as I know, not been hitherto tried by the surgeon. Of course, this method, in order to produce any good whatever, and in fact not to produce harm, must be applied equally to both legs. The system introduced by Professor Sayre attempts to effect a certain amount of extension as a continuation of the effects of suspension by the head and shoulders; but my experience of this method (undoubtedly the best hitherto adopted in supporting the trunk by lateral pressure, and modifying, if not altogether preventing, horizontal and lateral motion) does not lead me to think that any appreciable amount of longitudinal extension is kept up. It certainly does not answer well in those severe cases in which the recumbent posture is absolutely necessary in the treatment. The amount of the weight applied to the legs in the cases I have treated has not been great, sufficient only to give relief, and not to cause discomfort to the patient. Relief it certainly does give in the great majority of cases; and it does so, I believe, by protecting the diseased surfaces from the pressure produced by the contraction (spasmodic or otherwise) of the powerful spinal muscles, which are affected just as the muscles are which act upon the joints of the extremities, and produce the startings of the limb with which surgeons are familiar. We thus insure as great an amount of physiological rest to the diseased spinal structures as the problem before us will permit.

Lastly, the brief limits of my design permit me to mention only another class of cases, to which I have applied, I believe, for the first time, double extension to the legs. In a case of fracture of the lower lumbar vertebra, produced by a fall from a great height, and attended by complete paraplegia, I placed the patient on a water-bed, raised the foot of the bedstead on two blocks of wood eight inches deep, and applied gradually as much weight to the legs, by two of Buck's stirrups, as the patient could bear comfortably. The idea was, as in the cases of diseased spine, to take off from the fractured surfaces, by continued persistent and gentle extension, the pressure of the powerful longitudinal muscles of the spine, and to ensure as far as possible the apposition and rectilinear direction of the fragments of the broken spine itself. If we consider the effect of the simplest movements of the head and arms upon the spinal structures, and not less the effect of the movement of the ribs in coughing, sneezing, and even in ordinary respiration when the trunk is in the recumbent posture, or when we are floating in water, it will not be difficult to understand how this gentle and persistent extension acts on these structures when injured. The use of a water-bed does not prevent it; nay, in spite of its advantages in other respects, such as the prevention of bed-sores, and in the use of the bed-pan, the movement of the fractured surfaces upon each other is necessarily increased by the rolling and billowy motion of the water consequent upon the least effort of the patient, and produced even by the mere effort of respiration. Now, combined with the water-bed (so necessary in the treatment of these cases), we can very easily employ the system of double extension which I have advocated, and thus counteract to the utmost possible extent the injurious movement that I have mentioned. Again, in these cases there is always a tendency for the pelvis and buttocks to sink into the water-support, and thus to give a bend or curve to the trunk at the point of fracture. This is in a great measure counteracted by the extension, in the vertical direction of the body, by the action of the weights and pulleys. Double extension in such circumstances produces much the same effect as horizontal traction upon the body of the swimmer who is being taught to float by his instructors, by traction upon his head and legs.

I have found that patients express themselves as comfortable under its action, and I feel sure that, when properly and judiciously applied, double extension mitigates suffering and places the patient, as far as mechanical measures can, in a position most favourable for recovery.

CERTAIN VARIETIES OF CARDIAC NEUROSIS.*

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THE interest connected with cardiac neurosis appertains chiefly to its diagnosis and its etiology. The diagnosis must be made upon evidence partly negative and partly positive; whilst the cause of the affection will be determined by the personal history, and by an acquaintance with the special influence upon the heart of certain agents—medicinal, dietetic, and moral.

The term "neurosis" as applied to the heart is not strictly synonymous with "nervous palpitation"; the latter implies excessive action of the heart, permanent or recurrent; whilst "neurosis" means nervous derangement, and therefore includes every kind of simple disorder of function of the organ. It corresponds to the now discarded title of "functional disease of the heart".

The various causes of neurosis of the heart are anæmia, hysteria, hypochondriasis, dyspepsia, the gouty diathesis, debility from exhausting disease, rapid growth, or the excessive use of mercury, exhaustion from physical labour and protracted anxiety combined, intestinal worms, excessive mental strain and anxiety, worry and loss of sleep, shock, masturbation, the abuse of tea or tobacco, and the habitual use of opium in large quantity. To the last mentioned seven causes only I propose directing attention in this paper.

Under these heads, since the early part of last year, I have noted twenty-eight cases, viz.: hard study and anxiety, 2; worry of business and loss of sleep, 4; mental shock, 1; sexual abuse, 3; excessive use of strong tea, 4; excessive use of tobacco, 2; habitual use of opium, 1; sexual abuse, tea and tobacco, 3; sexual abuse and tea, 3; sexual abuse and tobacco, 2; abuse of tea and tobacco, 1; want of exercise and hypochondriasis, 1; fatiguing exercise and hypochondriasis, 1; in all, 28.

The ages of the patients ranged from fifteen to forty years; seven were under twenty years, fourteen between twenty and thirty years, and seven from thirty to forty years inclusive. Twenty-three were males, and five females. The average age of the males was a little over twenty-five years, and that of the females slightly over twenty-four. None of these patients were treated in hospital; they all belonged to the middle and upper middle classes, and several of them were students.

The general symptoms were a fear or a "certainty" of the existence of "disease of the heart", and an apprehension of sudden death; a feeling of stoppage of the heart's action; sharp pain at the heart; the sounds of the heart audible to the patient in bed; apprehension of loss of reason; a feeling of prostration, sinking, and as if "going to die"; flushing; sudden "jumping" of the heart, with pain in the head and tinnitus; fits of nervous palpitation and dyspnoea occurring frequently in bed, and starting out of sleep; a sensation on standing up as of "fluid rushing to the head"; "tension" of the head; chills; mydriasis; flatulence; abrupt or hammering impulse of the heart; præcordial thrill; local arterial throbbing; venous hum in the neck; small and rapid pulse.

The symptoms and signs of special significance were great and sudden variation in the rate of the pulse, without irregularity, in the sitting or recumbent posture; absence of palpitation and dyspnoea from physical exertion; a metallic or ringing quality in the sounds of the heart; reduplication or prolongation of the first sound, or a faint bellows-murmur accompanying it; reduplication of the second sound.

I have elsewhere described, under the title of "rhythmical irregularity", sudden changes in the rate of the heart's action from emotional influence, as especially characteristic of cardiac neurosis (*vide Diseases of the Heart and Aorta*, page 160). In several of the cases appended to this paper, examples of the phenomenon in question will be found. The rate of the pulse, whilst the patient is at rest in the sitting or the recumbent posture, may undergo sudden and repeated changes in the course of one minute, varying from six to ten beats within four consecutive periods of five seconds. The changes are abrupt, but the pulsation in each series is strictly rhythmical. Irregularity of the heart and pulse of this kind is especially characteristic of neural derangement from the toxic action of tea or tobacco, or from onanism; it is obviously the result of emotional disturbance of the co-ordinating function of the vagus.

To palpitation and derangement of the rhythm of the heart from these causes, Percival, Corrigan, Stokes, Walshe, Da Costa, Flint, and

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others, have long since directed special attention; but the derangement in question does not constitute irregularity of rhythm, such as that witnessed as a symptom of tissue-change in the heart, and should be carefully distinguished from it. Not only has physical exertion not the effect of increasing derangement of rhythm, or of inducing or aggravating palpitation and dyspnoea in the cases now under notice, as is invariably its result where structural disease of the heart exists, but the reverse; it has, when not excessive, a calmative effect upon the action of the heart and on respiration. The first sound of the heart has, in most of these cases, a sharp or metallic quality; in many, it is prolonged, and not unfrequently accompanied by a bellows-murmur. The second sound is sharp, and occasionally double.

The foregoing varieties and modifications of sound are all, but in different degrees, symptomatic of cardio-motor irritation, and excessive energy with diminished effective force of the heart. Tonic treatment is thereby indicated, especially iron and strychnia. A double first sound is often associated with the ordinary phenomena of cardiac neurosis; but in all such cases the point of apex-pulsation is displaced outwards, affording evidence of hypertrophy, with or without dilatation, of the left ventricle. Hypertrophy in this connection is strictly dynamic, the result of excessive bodily exercise or of long-continued emotional excitement of the heart, and iron is contraindicated, unless there be likewise spasmia, and conclusive evidence of ventricular debility and dilatation. The bromides of potassium and ammonium may be given with advantage.

The unhappy subjects of these cardiac derangements are tortured by the apprehension of organic disease of the heart and sudden death. Hence, skilled advice is sought mainly with reference to diagnosis. And indeed, in these cases, diagnosis is of more consequence than treatment; for a positive opinion as to the absence of organic disease, uttered with confidence, will go far towards curing the patient. I would not, however, be understood to convey that the diagnosis of simple cardiac neurosis is always easy of accomplishment. On the contrary, it is sometimes exceedingly difficult, especially where the patient is weak, the pulse rapid, and the subjective symptoms of an exaggerated character. If the apex of the heart be displaced outwards, and a strong impulse with a systolic thrill or murmur, or a prolonged or reduplicated first sound be present, the diagnosis will, of course, lie between dynamic and organic hypertrophy of the left ventricle on the one hand, and adynamic and organic mitral reflux upon the other. In regard to hypertrophy, the diagnosis may be confidently made by the exclusion of valvular, arterial, and renal disease, by means of the appropriate tests, which need not be here enumerated, and by the identification of other typical symptoms of cardiac neurosis. In the event of an affirmative diagnosis of simple dynamic hypertrophy, I would have no hesitation in declaring that, under suitable treatment, including complete abstinence from alcohol and a well regulated regimen, the affection is curable, at least in the sense of arrest of its further progress, and I should regard the life as fairly insurable. Adynamic mitral murmur is not often associated with simple neurosis of the heart. When present, it is accompanied with pallor and other evidence of anæmia and muscular debility, to which, and not to the neural derangement, it owes its existence. Hence the frequency of its occurrence in exophthalmic goitre and chorea; it is always faint, soft in quality, accompanying or succeeding, not replacing, the first sound; it is not audible at the left scapula, and is for the moment suspended or rendered inaudible by a physical effort, such as the act of assuming the sitting or the standing posture. In all these respects, or rather in the *tout ensemble* of them, as well as in the absence of pulmonary congestion and its consequences, the non-organic mitral murmur differs from that due to lesion of the mitral valve.

In reference to diagnosis, I have known grave mistakes, involving serious consequences, to have been made by well informed physicians in cases of the kind now under discussion; and, not long since, a man presenting the typical phenomena, general and special, of cardiac neurosis, but organically sound, exhibited to me a certificate of discharge from the Navy for organic disease of the heart.

The elements of differential diagnosis to which I would invite special attention, enumerated in the order of their relative importance, are: the absence of vascular congestion and dyspnoea, and of the typical signs and symptoms of valvular and renal disease; the improvement of the pulse and breathing under moderate physical exercise; sudden and repeated variations in the pulse-rate from emotional disturbance whilst the patient is under examination, with flushings and other evidence of vaso-motor erethism; sharp quality of the sounds of the heart; and a disposition on the part of the patient to exaggerate symptoms and sufferings.

In addition to what has been already incidentally mentioned, little needs to be said in regard to treatment. The withdrawal or correction

of the noxious agency, whatever it may be, must be the primary object of the physician. Not unfrequently, varicose enlargement of the left spermatic veins will be found to be the immediate cause of habitual seminal emission, and remotely the origin of nervous palpitation. For this, the cold douche, regulation of the bowels, and a scrotal suspensory are the best remedies. For the rest, tonic treatment—medicinal, dietetic, and general—including iron, strychnia, digitalis, pure air, the cold bath, and active exercise, constitute the sum of treatment.

CASE I.—Mr. C. C., aged 24, a medical student, some time nervous and subject to emissions, an occasional smoker, florid and healthy-looking, thought he could not sleep, and that he had an enlarged liver and disease of the heart. He was flatulent after meals. The pulse was variable in rate, irrespectively of change of posture; the tongue coated, the bowels confined, the abdomen inflated. Both sounds of the heart were clear, and double at the midsternum, so that four sounds were audible here. Of the first sound, the primary element was dull, and the second sharp and clicking, both being audible likewise at the apex. The second sound was faint, and single at the apex. I assured him that he had no organic disease, urged him to continue his studies, which he had thought of abandoning through fancied ill-health, and prescribed ten grains of bromide of potassium, with ten minims of ammoniated tincture of valerian three times a-day, an aloes and assafoetida pill at night, and tepid or cold showers.

CASE II.—A gentleman, aged 31, had been subject to "emissions", and had been an inveterate smoker, but had given up the habit six months previously. He had spent four years in South America. Ten months before I saw him he experienced, whilst taking a brisk walk, a feeling of "swimming" in the head and "sudden stoppage of the heart". This feeling returned once since that date, after a fit of anger. He looked well. He was constipated. His pulse was good, but "rhythmically irregular". The cardiac sounds were normal, but at the apex a doubtful bellows-murmur accompanied the first sound. He was ordered to have five grains of bromide of potassium three times a day; to have a compound rhubarb pill with soda and hyoscyamus at night; and to take exercise.

CASE III.—M. D., a large and apparently healthy farmer, aged 23, had neuralgia in the right hip and side. When seventeen years old, he contracted the habit of masturbation, which he continued up to the age of twenty. He had left varicocele and atrophy of the left testis. Pulse abrupt, and varying from 72 to 84 in the minute. The apex-pulsation was in the normal situation; the impulse "hammering", and the first sound prolonged. He was ordered bromide of potassium with ammoniated tincture of valerian, and an aperient pill; and to have a strong solution of tannic acid (100 grains to an ounce of water) brushed over the left testicle and cord every night.

CASE IV.—Mr. R., aged 26, an accountant, nervous, and for some years suffering from gastric derangement and flatulence, complained of "shifting" or "gnawing" pain in the spine. His bowels were irregular; appetite and sleep satisfactory. He was robust, but anxious-looking, and disposed to magnify his symptoms. He smoked, and drank beer freely. The pulse was "rhythmically irregular", averaging about 96. The first sound of the heart was double, the first element being dull and the second sharp. He was ordered to take an aperient pill, and a mixture of nitro-hydrochloric acid, with ammoniated tincture of valerian in infusion of gentian; and to give up tobacco and beer.

CASE V.—Mr. O. H., aged 16, a student, had practised "self-abuse", and taken strong tea with very little milk twice, and occasionally three times, daily. He suffered from palpitation, headache, flatulence, general debility, and a difficulty in applying himself to study. The apex-beat was half an inch inside the nipple-line; the impulse was strong, abrupt, and accompanied with thrill; both sounds were sharp. The pulse-rate varied from 84 to 108 within a few seconds. He was directed to give up tea, and to take strychnia and iron.

CASE VI.—Mr. D., aged 22, law student, took strong tea twice daily. He complained of "tension" in the head, flushing, and palpitation, and also of throbbing at the inner angle of one of his eyes. The pupils were dilated, and he was "generally out of health". The pulse was throbbing, and varying in rate in the sitting posture between 96 and 120 within a few seconds. The apex of the heart pulsated half an inch inside the nipple-line; the impulse was strong and abrupt; the sounds sharp and clear. He was ordered to give up tea, and to take iron with strychnia.

CASE VII.—Mr. E. C., aged 28, had never been seriously ill, but had practised "self-abuse" up to two years ago. About that time, he had a "nervous attack", and the heart beat as if it were "going to stop". He was accustomed to take strong tea twice, and often thrice, daily. He had had many such attacks since then. He heard his heart beating when he lay down, and could not lie on the left side; he felt prostration, as if he were "going to die". The heart "jumped up", and he

felt sudden pain in the head, and noise in the ears. He was subject to flushings. He was not breathless on exertion. The pulse was abrupt and varying, in the sitting posture, from 84 to 110, these rates alternating within a few seconds. The sounds of the heart were sharp, and the first faintly double. He was advised to give up tea, to take active exercise and cold showers, and to have tincture of nuxvomica and iron in a bitter-infusion.

CASE VIII.—Mrs. M. B., aged 38, a travelling *religieuse*, had been in good health till she started on a long journey a month previously, since when, having been much worried in mind and body, and frequently deprived of her regular meals, she had taken very strong tea in large quantity, and often without much solid food. Latterly she had experienced fits of dyspnoea with palpitation, accompanied with a feeling as if she were "going to die"; these fits came on in bed. She had pain in the region of the heart; pulse small and rapid (120), but regular; heart's action excited; sounds sharp and clear. She had psoriasis guttata on the front of the chest; this had been always brought out by the free use of tea. She was ordered to have an opium plaster applied to the region of the heart, to take iron and nuxvomica, and to give up the use of tea.

CASE IX.—Mr. J. O. B., aged 35, a professional man of fine *physique* and active habits, temperate in regard to alcoholic stimulants, but fond of strong tea, which he had often taken three times, but invariably twice, in the day, and indulged in a cigarette occasionally; had had rheumatism, and was nervous in regard to his heart. Two years previously, he experienced for the first time palpitation and want of breath on exertion. Latterly, these attacks had become more frequent and severe. He was occasionally awakened by anomalous sensations in the region of the heart, accompanied by palpitation and difficulty of breathing. On going up-hill he was similarly affected, but there was no thoracic or brachial pain. The pulse was 84, full and regular, but occasionally accelerated while he was under examination. The position of the apex-pulsation and the impulse of the heart were normal. The second sound was sharp at the right base. He was ordered to take strychnia, quinine, and colchicum; to be exceedingly moderate in the use of tea and tobacco, or to give them up entirely; to continue active exercise, and live on an elevated site (he had been advised by a medical man to avoid exertion and change his residence), and to take showers and cold sea-bathing.

CASE X.—A general medical practitioner, aged about 50, accustomed to the use of strong tea, and an inveterate smoker up to eight months previously (his ordinary allowance being an ounce and a half of strong tobacco daily), when he ceased to smoke, owing to the occurrence of variation in his pulse, with occasional intermissions, and a sensation of "tightness" and oppression in the region of the heart and left side generally, was apprehensive of heart-disease. He looked healthy; his sleep and appetite were good. There was no dyspnoea on exertion; pulse 84, regular; the sounds of the heart were sharp. He was ordered to give up tea, to take shower-baths, and, thrice daily, tincture of nuxvomica, iron, and spirit of nitrous ether. I saw this gentleman a year later, when he came to consult me in reference to his brother. He was then free from all his symptoms, as I judge from his silence in reference to them.

CASE XI.—Mr. B., a solicitor, aged 30, naturally nervous and anxious, had been accustomed to active exercise, which two years ago he gave up entirely. He had excessive professional work and insufficient sleep. He was "certain" he had heart-disease and must die. There was sharp pain in the region of the heart, and palpitation, but no dyspnoea or cough. The heart's action was "rhythmically irregular", varying in the sitting posture from 84 to 120. The pulse was of good volume. The second sound of the heart was double. I assured him he had not disease of the heart, and prescribed quinia and strychnia, bromide of potassium and morphia at night to ensure sleep, and aperients. A week later, he reported himself as "not nearly so nervous", and sleeping well. His pulse then varied from 84 to 96.

CASE XII.—Thomas C., aged 16½, had been addicted to "self-abuse" (but not for the last six weeks), and accustomed to drink strong tea. He had an attack of palpitation five weeks previously; then thought he was dying, and insisted on sending for a clergyman. He had not had rheumatism nor hæmoptysis. There was no dyspnoea. The pulse varied from 72 to 96. The apex-beat was half an inch inside the nipple-line. The impulse was strong and attended with thrill. The sounds (especially the first) were sharp. There was varicose enlargement of the left spermatic veins. He was ordered to take iron and strychnia and aperient pills, to have an opium plaster over the heart and an elastic scrotal bag; to give up tea.

CASE XIII.—J. H., aged 19, a medical student; had been a great smoker since he was sixteen years old, using half an ounce of strong tobacco daily. He had taken tea freely, and had been addicted to

masturbation. He complained of palpitation, which was especially troublesome at night. He had visible pulsation of the arteries. Pulse abrupt, 96, but variable in rate. Whilst standing and making a forced inspiration, the pulse-rate descended to 48. A thrill was felt at the apex of the heart, which pulsated in the normal position. The impulse was strong and abrupt; the sounds sharp and clear. There was a faint systolic murmur at the base, louder at the left than at the right base, and not audible in the neck. He was ordered to have iron and strychnia, and an opiate plaster to the præcordia. A month later this gentleman returned, feeling much better. His pulse was then 84 and scarcely variable. There was a venous hum in the neck. He was ordered to have dialysed iron and digitalis.

ON AORTIC REGURGITATION AND THE CORONARY CIRCULATION.*

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IN the second edition of his work on *The Heart and its Diseases*, Dr. Milner Fothergill takes up and extends an opinion of Dr. Balthazar Foster concerning the relations of aortic regurgitation and the coronary circulation, which opinion seems to me to be erroneous, and to be based upon a not less erroneous conception of the theory of the circulation. Dr. Fothergill's works are so attractively written and give evidence of so much enthusiastic labour, Dr. Balthazar Foster's name again is a name which carries so much lawful weight, that I feel the more bound to protest against the opinion to which I refer, lest it should gain a credence wholly disproportionate to its truth. My two friends are so rich in achievement that they can well afford either to withdraw from an untenable position, if I prove it to be untenable; or, if I fail, to forgive my indiscretion. The subject is one on which for many years I have bestowed more or less unsuccessful pains, and the opinion I shall quote is one which, rightly or wrongly, I rejected long ago. It is expressed most distinctly on page 504 of Dr. Milner Fothergill's second edition. He says, "Aortic regurgitation is, usually, swiftly fatal, from the nutrition of the heart failing early, the blood escaping past the coronary orifices instead of eddying into the sinuses of Valsalva; indeed, Balthazar Foster has pointed, with terrible distinctness, to the effect exercised prognostically, by the fact of which aortic cusp is ruptured—if the one behind which there is no coronary artery, then the prognosis as to duration of life is better than if either of the other cusps are torn down."

Now, that aortic regurgitation is "usually swiftly fatal" is a proposition so much open to qualification as to unfit it for Dr. Fothergill's dashing and effective utterances, but it is when the author rises to the heights of melodrama that I think he is least successful. What if this terrific attitude of Dr. Foster and himself be taken up on a false footing, as I scarcely doubt that it is? Let us see exactly what Dr. Foster and his disciple mean. First, that in all cases of aortic regurgitation the blood "escapes past the coronary orifices, instead of eddying into the sinuses of Valsalva"; secondly, that this ineffective passage and its consequences are diminished if one of the cusps subtending a coronary artery persist. I think this is precisely what is meant; and it follows of necessity that these authors believe that in the normal state the coronary arteries are filled by a sort of squirting action which is incidental to the systemic circulation. Surely, to begin at the beginning, this latter proposition is based upon views of the circulation which all physicists have given up, or would give up, if they applied their present knowledge to the problem of the circulation. Nay, the opening paragraphs of Dr. Fothergill's own book led one to expect a larger view of the matter than this. I extract the following sentences, "Such a power of adaptation (to the needs of the organism) is secured by means of the beautiful nerve-adjustments through which and by which the regular rhythmic action of the heart is maintained"; again, "In order to maintain the balance of the circulation, and a steady equilibrium betwixt the bulk of blood in the arteries and in the veins, constant modifications in the heart are necessitated, including variations in the size of the ventricular chambers; and these are rendered possible by the exquisite nerve-balances amidst which the heart swings". Quite true; in the general allusive sense in which such introductory words are to be taken, nothing could be better. Then how comes Dr. Fothergill to fall from this real point of view to the clumsy notion, that in aortic regurgitation a prominent cusp acts as a shovel would act if held in a running stream? Surely the whole circulation since the time of Harvey has been regarded more and more as a "closed cell", and surely then the pressure upon

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