The prevention of the diseases peculiar to civilization / by Sir W. Arbuthnot Lane.

THE PREVENTION OF THE DISEASES PECULIAR TO CIVILIZATION

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THE PREVENTION OF THE DISEASES PECULIAR TO CIVILIZATION

BY

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PREFACE

IT is a grave indictment of our present social system that the great institutions designed for the purpose of social amelioration, the medical and legal professions, the Church and the State, tend only to deal with certain unhealthy *end-products* created by our obviously imperfect civilization. Not one of these organizations, in which by common consent so much power is vested, exhibits to any degree a desire to seek out radical causes of social evil and to apply methods for its prevention. Though of necessity aware of the prevalence of much physical, mental and moral unfitness, they endeavour to *cure*—usually by more or less empiric methods—rather than to *prevent* that which is simply a natural reaction to a morbid condition of civilization. Such a myopic attitude of mind can only be attributed to defect either of intelligence or of courage. Unfor-

tunately for the future of the race, it is this orientation of mind which is predominant amongst those who are the guardians of posterity.

And so it comes about that the average doctor is much more interested in treating a sick man than in keeping a fit man fit, and the prison chaplain is much more concerned with the reform of a criminal than with keeping a temporarily law-abiding citizen out of prison. And it follows that a triumph in therapeutics or an innovation of the penal system will be hailed as a landmark of social progress, while comparatively prosaic and unobtrusive achievements which aim at preventing the need for such novelties will pass unnoticed and neglected.

Thus it is clear that the discovery of a cure, whether of a physical disease or of a particular social evil, has in it an element of danger. If it is easy to remedy a defect, why bother to go to painstaking lengths to prevent this defect? To take examples: If radium can cure cancer, why labour to learn the means of its prevention? If prison can change a habitual criminal

into an honest man, why strive to alter the social conditions which foster criminals ?

Such an argument is uneconomic and non-biological. Firstly, sickness, physical or moral, is expensive to the community, as is of necessity its cure ; and secondly, the persistence of the conditions which lead to such sickness will ultimately produce a deterioration of the racial health which will render ineffectual the policy of 'end-result-cure'.

It is a principle of modern medicine to treat the primary disease and not to cure symptoms, but why not logically proceed further and attack the underlying conditions which produce the disease ?

It will be my endeavour to prove in this book that certain faulty habits of our civilization, particularly in relation to diet and intestinal function, produce within our life-time certain structural changes in our anatomy which inevitably result in a chain of diseases of varying gravity. In other words, it is my object to show that it is these unnatural conditions of civilization which are the *fundamental causes of disease*, and that the elimination of

disease is not dependent upon therapeutic inventions, but upon a complete revolution in our diet and habits.

Mr. George Bernard Shaw, in his preface to *English Prisons under Local Government*, by Sidney and Beatrice Webb, logically applies the basic principle demonstrated in this book, of the creation of types in response to the special conditions of the environment, in an analysis of the development of the criminal.

'*How Types are Manufactured.* Twentieth century observation has lately been knocking nineteenth-century science into a cocked hat. I have in my hand number seventy-four of the privately printed opuscula issued by the Society which calls itself the Set of Odd Volumes. It is entitled *The Influence Which Our Surroundings Exert on Us*, and is the work of Sir William Arbuthnot Lane, one of our most distinguished surgeons. In it he shows that by keeping a man at work as a deal porter, a coal trimmer, a shoemaker or what not, you can, within a period no longer than that spent in prison by typical criminals, produce a typical deal porter, coal trimmer

and so on, the changes involved being visible grotesque skeletal changes for which Huxley or Owen would have demanded a whole evolutionary epoch. No Bolshevik has yet written so revolutionary a pamphlet as this little record of a recent after-dinner speech.

'What it means is that the criminal type is an artificial type, manufactured in prison by the prison system. It means that the type is not one of the accidents of the system, but must be produced by imprisonment no matter how normal the victim is at the beginning, or how anxious the authorities are to keep him so. The simple truth is that the typical criminal is a normal man when he first enters a prison, and develops the type during his imprisonment. Hitherto the Darwinian criminologists have declined to believe this, like Moliére's doctor who asserted that the coachman must be alive because he had been ill only three days, whereas Hippocrates describes his disease as proving fatal at the end of six weeks. It is Sir William Arbuthnot Lane who now comes forward with the modern equivalent of the famous *mot*, "Hippocrates may

say what he likes; but the coachman is dead." And as the official world will believe a surgeon baronet when they will believe nobody else in heaven or on earth, I call him to witness accordingly.

'*Psychiatrists and Endocrinists.* This does not mean that no other types are to be noted in prison. By all means let the endocrinists go on dividing abnormal people, in prison and out, into hyper- and subpituitaries and thyroidics and adrenals. They need not, as the habit of the scientific world is, quarrel furiously with me for remarking that another type can be externally imposed on their pituitaries and thyroidics and adrenals impartially. The fact that a man has an excessive adrenal secretion may be a reason for trying to check it instead of punishing him. It does not alter the fact that if you keep one adrenal in penal servitude and another in the House of Lords for ten years, the one will show the stigmata of a typical convict, and the other of a typical peer, in addition to the stigmata of adrenalism.

'To realize the importance of this, we must recall the discredit into which Lombroso fell

when it was pointed out that by his diagnosis everybody was more or less a criminal. I suggest that this was not quite so complete a *reductio ad absurdum* as it seemed. I have already accounted for the curious insensibility of the public to the misery they are inflicting on their prisoners by the fact that some of the most mischievous and unhappy conditions of prison life are imposed on all respectably brought up children as a matter of course. It is arguable that what Lombroso took to be criminal stigmata were genuine prison stigmata, and that their prevalence among respectable people is due to the prison conditions to which respectable people are subjected for the first twenty years of their life.'

Substitute invalid for criminal and the diet and habits of civilization for the prison system, and the argument is equally sound.

It should be clear to the thoughtful that by educating the people in the simple laws of health, the necessity for the existence of a large number of hospitals, asylums and jails would no longer remain, and it is also clear that a fraction of the money obtained from a

sympathetic public to build and maintain a hospital could be spent with infinitely greater advantage in health education. Unfortunately the thoughtful appear to be few in number, and an appeal to cure disease has a much greater response than an appeal to educate towards health. A reversal of this state of affairs will only come about when it is generally recognized that physical ill-health is a product of unnatural living and that it is quite as anti-social as moral ill health. A change of mental perspective is necessary on the part of our rulers and makers of public opinion if a healthy future for our race is to be achieved.

W. ARBUTHNOT LANE

§1. THE FUNDAMENTAL LAWS

BEFORE considering the diseases peculiar to civilization I would venture to place before you the general principle upon which their causation depends and on which their prevention is based. I formulated it as long as forty years ago.

It is that: 'We bear a simple mechanical relationship to our surroundings: any change in that mechanical relationship produces a corresponding alteration in our anatomy', with the corollary that: 'Everything that nature does to help to meet such an alteration in our mechanical relationship to surroundings tends to shorten our life.'

It is upon this law that chronic intestinal stasis together with all its sequelæ is founded.

At first sight the reader may wonder what the changes I am about to describe in the bones and joints of the body have to do with the

causation of the diseases of civilization and their prevention. I would ask him to be patient till I have stated my case.

When I was teaching anatomy in the dissecting room of Guy's Hospital, I was struck by the innumerable deviations from the normal that were presented by the bones and joints of the bodies of the labourers who formed the vast proportion of the subjects for the purpose of dissection.

These changes, when observed by the pathologists, were regarded as being evidences of a disease called osteo- or rheumatoid-arthritis, or of tuberculosis, while other deviations from the normal were stated to be congenital, meaning that they existed previous to birth.

A detailed study of the skeletons of these labourers showed that the several variations from the normal had resulted in accordance with the following laws, namely:

1. The skeleton represents the crystallization of lines of force.
2. Pressure exerted habitually over a long period of years results in alteration in the

form and texture of bones, cartilages, and joints, old joints being destroyed and new ones being developed.

3. Strain exerted constantly over a period of years produces very marked and somewhat similar results in bones and joints.
4. Apart from the exercise of pressure or strain, when it is to the advantage of the individual in his altered mechanical relationship to his surroundings, an old mechanism is altered or an entirely new one evolved.

The application of these several principles rendered it easy to determine the labour history of the individual by the examination of his skeleton.

It would be impossible in this brief work to consider exhaustively the typical changes presented by various labourers, but I will satisfy myself with indicating briefly, by illustrations, examples of the effects of these laws.

1. *The skeleton represents the crystallization of lines of force.*

This is shown by the redisposition of bone along such lines in a fracture when the frag-

ments are displaced on one another.

Fig. 1 shows a fracture of the lower end of the humerus, the shaft of the bone being displaced forwards from its lower extremity.

Fig. 2 was taken six weeks after the receipt of the injury, and the radiogram at this early period shows a dark shadow extending from the lower fragment along the back of the shaft, being a crystallization of lines of force.

Fig. 3, taken after some months, shows this process of recrystallization progressing.

Fig. 4, taken after another interval, indicates a further stage.

Fig. 5 shows the old shaft disappearing like a ghost, the new one becoming correspondingly dense.

Fig. 6, taken after many months, shows that all that remains of the old shaft is represented as a bulge or prominence on the new shaft.

This child was ten years of age at the time she sustained the injury. The degree of recrystallization varies inversely with the age of the subject. Later in life the recrystallization is limited to the seat of the fracture and is spoken

of as callus. Even in advanced age, however, the skeleton does its utmost to effect as complete a restoration as it can to the normal.

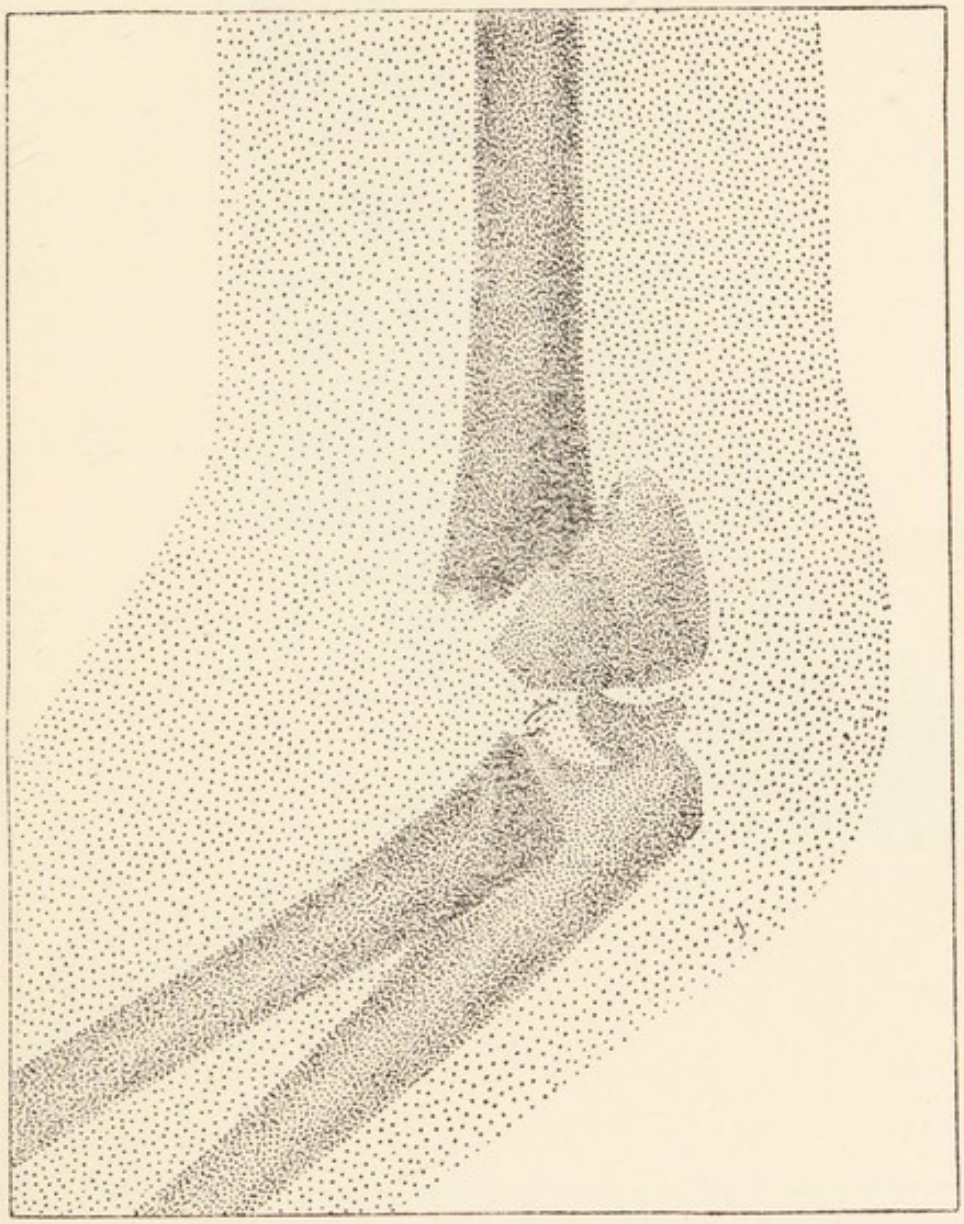


Fig. 1 shows a fracture of the lower end of the humerus, the shaft of the bone being displaced forwards from its lower extremity.

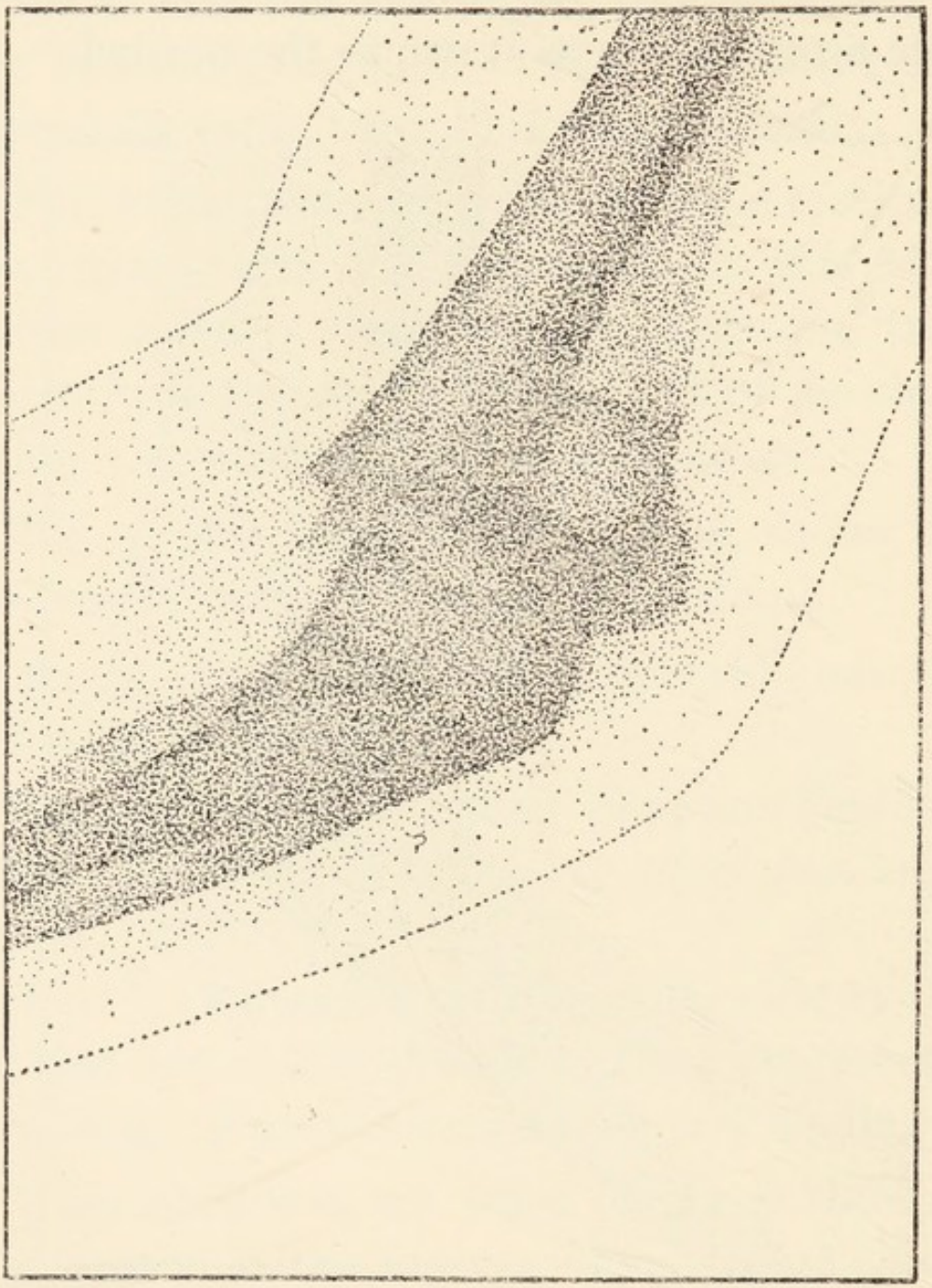


Fig. 2 shows the same fracture as Fig. 1, six weeks after the receipt of the injury.

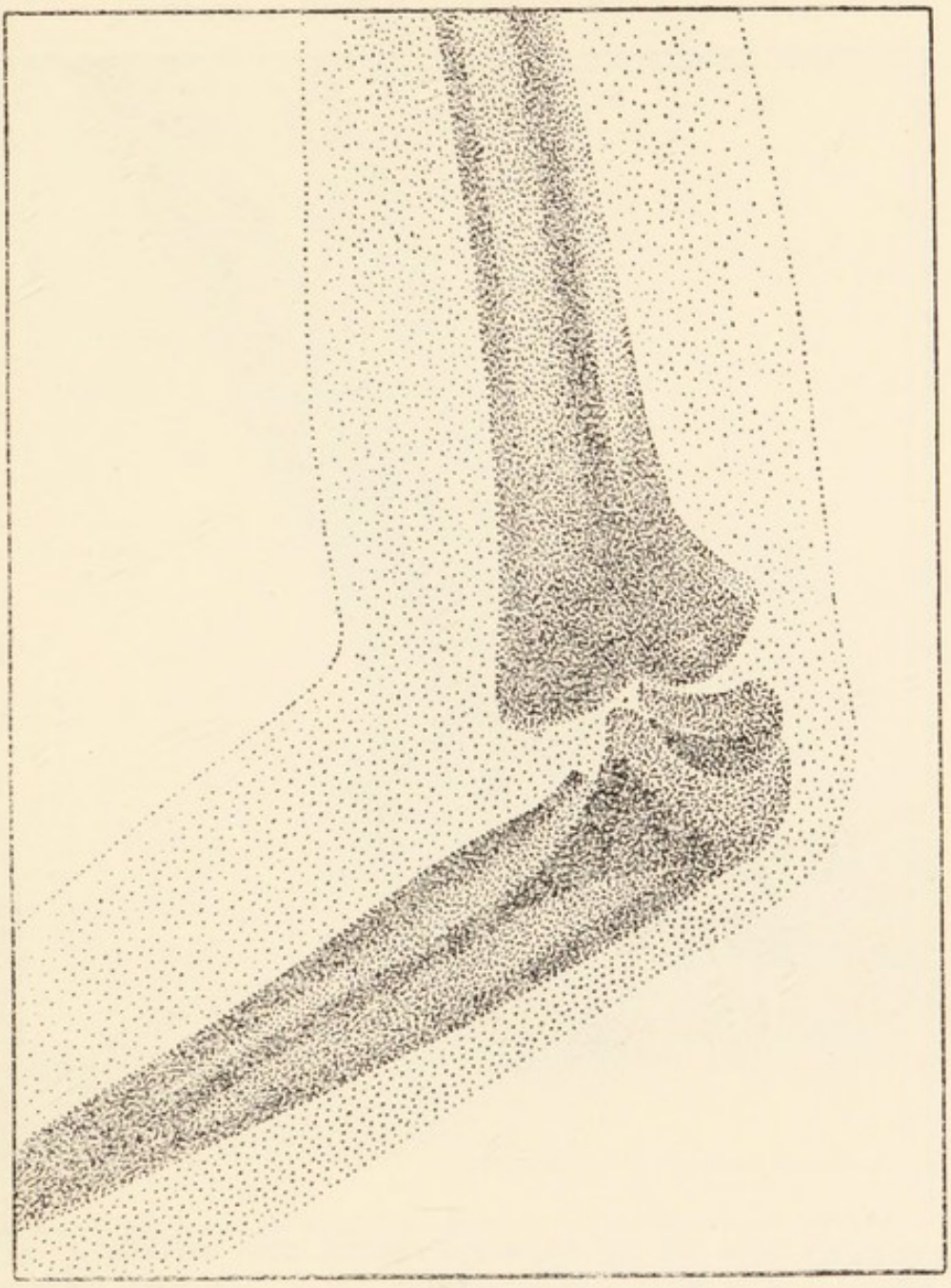


Fig. 3 shows the same fracture as in the previous figs. after some months.

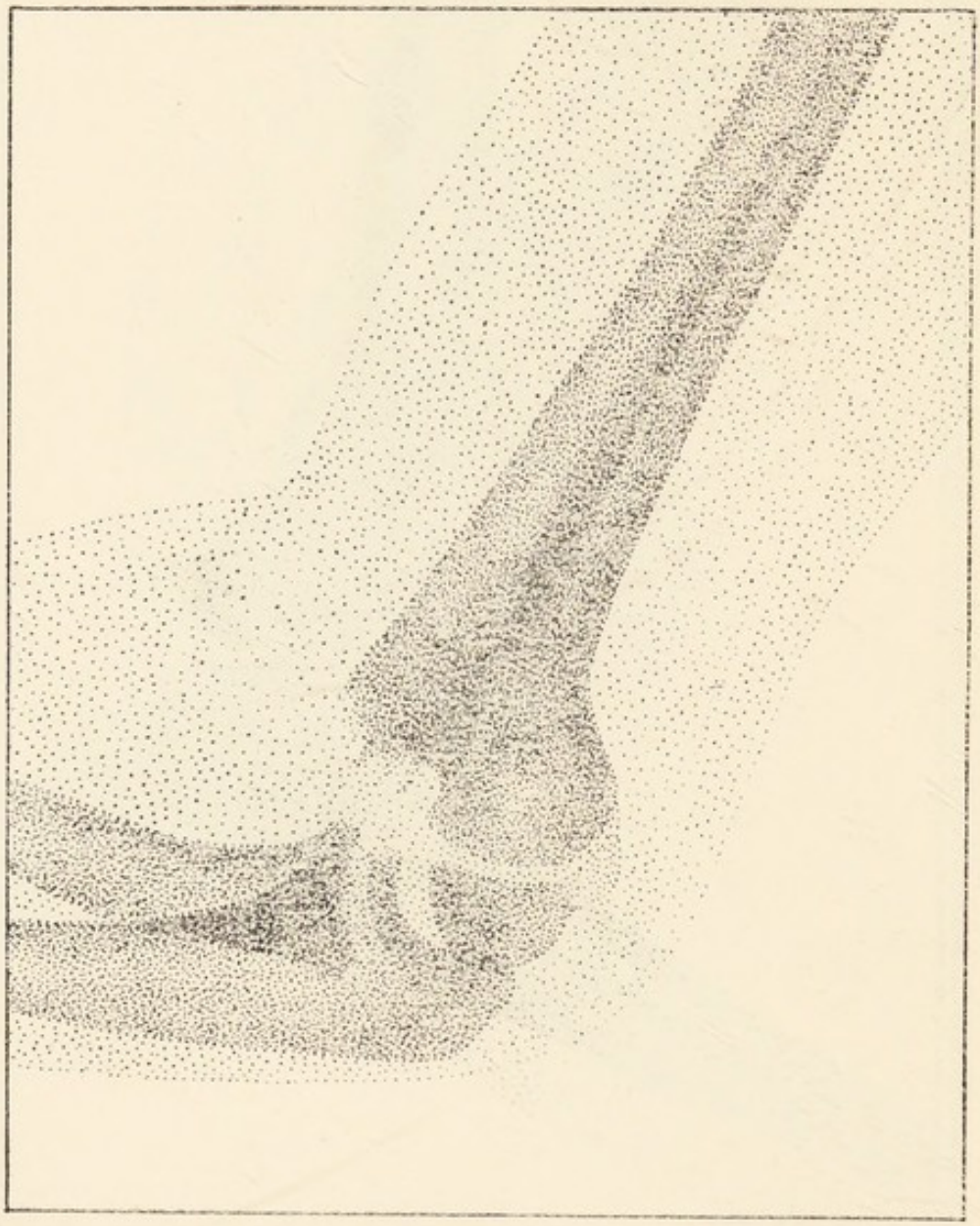


Fig. 4 shows the same fracture as in the previous figs. at a later stage.

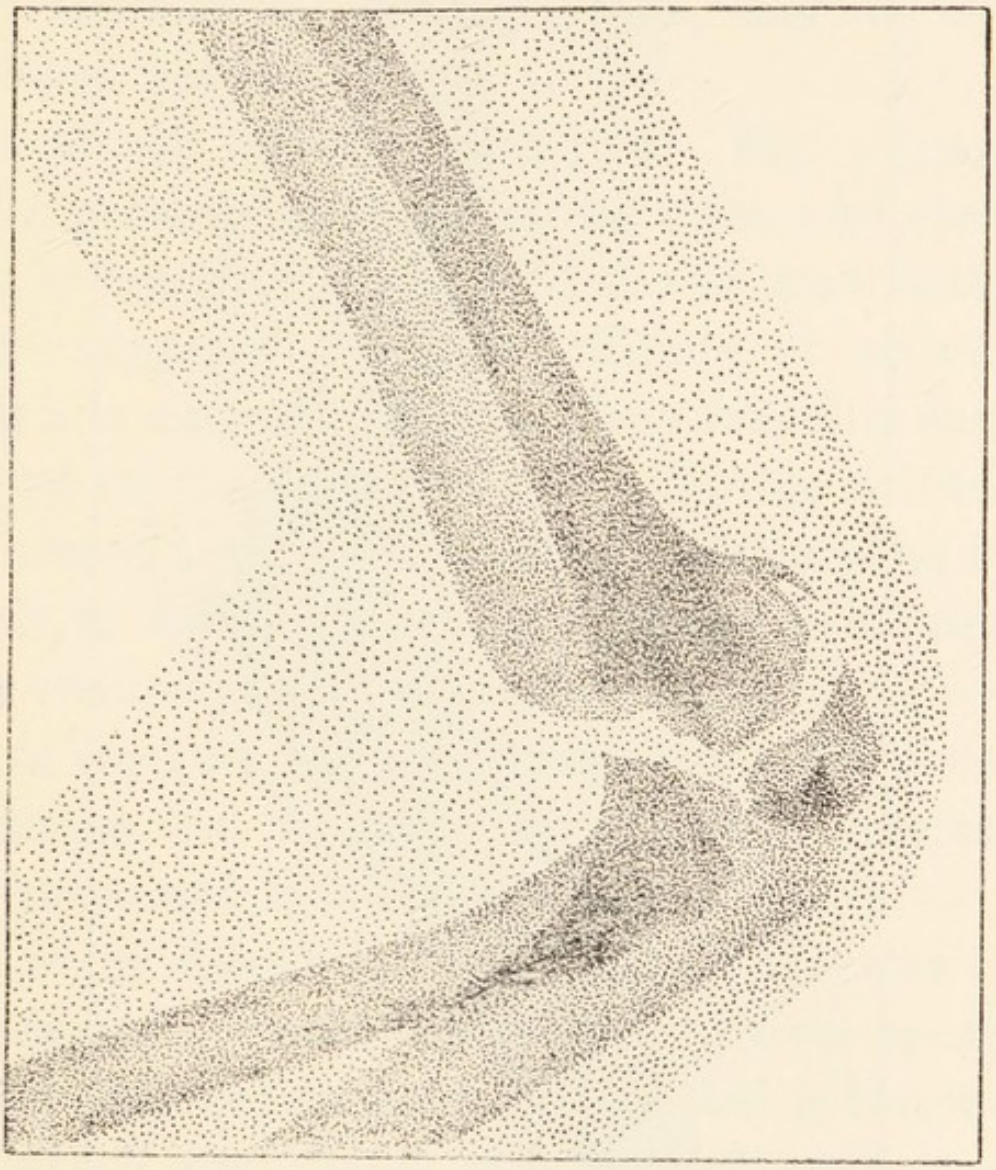


Fig. 5 shows the same fracture as in the previous figs., with the old shaft disappearing and the new one becoming more dense.

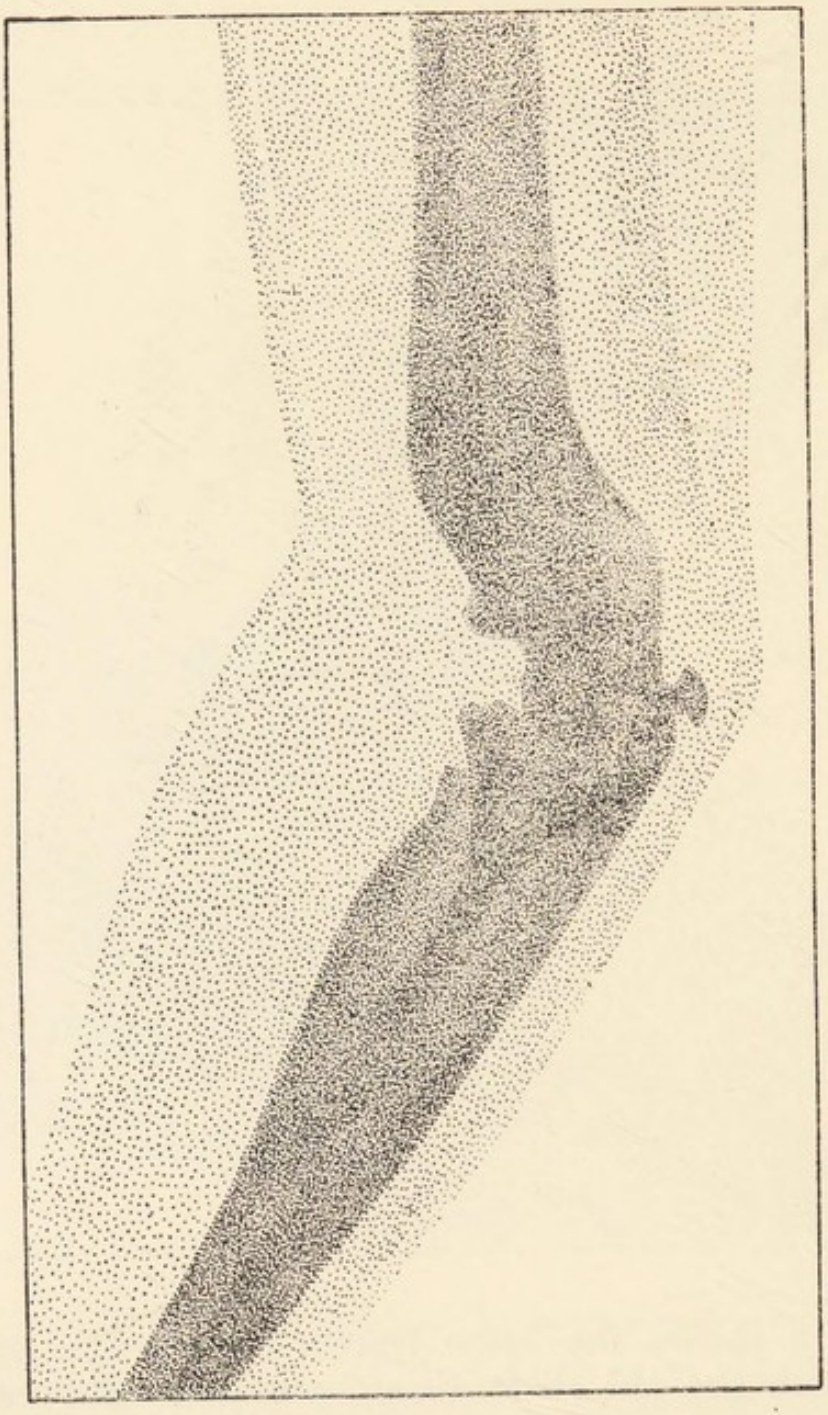


Fig. 6 shows the same fracture as in the previous figs. after many months. All that remains of the old shaft is represented by a bulge in the new shaft.

(2) *Pressure produces definite changes in the form and function of the bones and in the form and function of existing joints, and it also produces new joints.*

This will now be illustrated. Fig. 7 (page 18) represents portions of the spine and chest of a brewer's drayman, and shows the fixation and exaggeration of the attitude of activity which is assumed when a heavy barrel is supported on the right shoulder. In this attitude numerous tendencies to change exist, and by its habitual assumption these becomes actualities. The change in form is occasioned by the bending of the ribs, by the destruction of the fibro-cartilages and the bone at the seat of greatest pressure, and by the formation of thick bony lips at the margins of the articular surfaces to increase the security and strength of the spine. In this manner an almost rigid shelf is formed on which the barrel can be supported and through which the weight can be transmitted with a minimum expenditure of muscular energy.

This spine and chest, which appear so much deformed, are the normal anatomy of this par-

ticular form of labour, though even to the least informed in anatomy it differs from the normal skeleton infinitely more than the normal differs from the monkey. It represents in a nutshell the secret of evolution.

As in all the changes that the skeleton undergoes to help the labourer to meet his special or abnormal mechanical relationship to his surroundings, the object is to enable him to perform his very heavy work with a minimum of expenditure of nerve and muscle energy. This will be borne out by a study of these other labour changes.

We are all familiar with the coal-heaver who takes on his back from a cart a sack of coals weighing two hundredweight which he carries and, bending forward his trunk, deposits the contents in a hole in the pavement. The result of the constant transmission of pressure through the bones of his trunk is that the spine becomes converted into a rigid shelf and the chest becomes more or less immobilized.

Figs. 8 and 9 (page 19) show the spinal column of a coal-heaver as seen from one side and from the front. Note the extraordinary

and very obvious pressure changes in the vertebræ and joints. The bodies of the vertebræ are compressed, and lips of bone have been developed on their edges. The joints between the vertebræ, and especially between the lower ones, have been obliterated, the bones being joined together by dense ivory-like bridges so that they no longer move on one another as in the normal. The spine has been converted from a pliable column into a rigid rod. Note also the changes in the joints between the ribs and vertebræ which limit their range of movement.

Fig. 10 (page 20) represents a vertical section through the lower end of the same spine. This shows a displacement of the last vertebra forward off the sacrum, the division of a portion of this vertebra into three parts, and a complete destruction of the joint which exists between these bones in the normal subject.

This provides an example of the truth of the corollary stated above, that: 'Everything that Nature does to help to meet an alteration in our mechanical relationship to surroundings tends to shorten our life.' It is obvious that the

various extensive modifications render the coal-heaver less able to escape disease and injury. When the attitude is fully developed he has to depend chiefly on the action of his abdominal muscles for the efficiency of his respiration, since his spine and chest have been rendered rigid and inelastic by his occupation. Therefore such a man succumbs much more readily to any pulmonary complications than does a normal individual.

Fig. 11 (page 21) shows the condition present in a labourer whose duty it was to pick up logs from the ground, to carry them for a distance and then to deposit them elsewhere. Even to the superficial observer the difference between the forms of the bones and joints in figs. 10 and 11 are very obvious. Instead of the obliterated joint of the coal-heaver, this man possesses a joint which is abnormally mobile to meet the peculiar attitudes performed in his occupation.

Fig. 12 (page 22) is a vertical section through the lower part of the spine of a man who habitually carried a heavy load in front of his body. Observe how the spine is displaced backwards

off the sacrum, and the manner in which the several portions of these bones differ from those in figs. 10 and 11.

Figs. 13 and 14 (page 23) represent the spine of a man whose occupation consisted in carrying heavy loads on his head. Formation of a lateral curve as shown in fig. 13 served to diminish the vertical impact and shock. Evidence of the effect of the impact is illustrated in fig. 14. Note the fusion of the second and third vertebræ and the marked changes in the character of the joints between the bones.

A coal-trimmer is a man who stands in the hold of a ship, and as the coal is thrown down in a heap he distributes it uniformly by means of a long shovel. To do this he must twist his trunk very forcibly in order that the load he takes from the front of him shall be thrown to his left, behind him, and then away to the right. The torsion on his spinal column must be tremendous. As a result of this he cuts through the arch of his fourth lumbar vertebra and makes a loose joint between the bodies of the fourth and fifth.

Figs. 15, 16 and 17 (page 24) show portions

of the spinal column of a coal trimmer. Fig. 16 shows the manner in which the fourth lumbar vertebra has been divided in the very forcible rotation of the trunk which occurs in this occupation. Fig. 15 shows the divided vertebra in position, with development of a joint cavity in the fibro-cartilage between the fourth and fifth vertebrae. Fig. 17 shows the manner in which the head of the first rib is secured by a bony shelf in order to enable the swing of the shovel to be carried out most effectually.

Other evidences of the influence of excessive pressure upon the skeleton are illustrated by the following:

Figs. 18 and 19 (page 25) show how the tremendous leverage exerted through the clavicle on the first costal arch in the dock labourer results in the conversion of the first costal cartilage into bone, and in the development of an entirely new, very mobile joint in the centre of the ossified cartilage. The other new joints are indicated as dotted outlines and have developed to meet the altered mechanical relationship of the individual to his surroundings. These new formations are illustrated

more clearly in fig. 10 which shows the under surface of the clavicle.

Similar changes are shown in figs. 20 and 21 (page 26) which are vertical sections through the sternums (breast bones) of labourers who carried heavy loads on their backs. Note the various modifications in the joint between the two segments of the bones. In fig. 20 it is seen that the opposing surfaces of bone have been increased in area considerably, while the intervening ligamentous tissue has been rendered scant and dense. In fig. 21 the joint has been almost completely obliterated by being bridged over in front, and by the formation of masses of bone in the ligament behind.

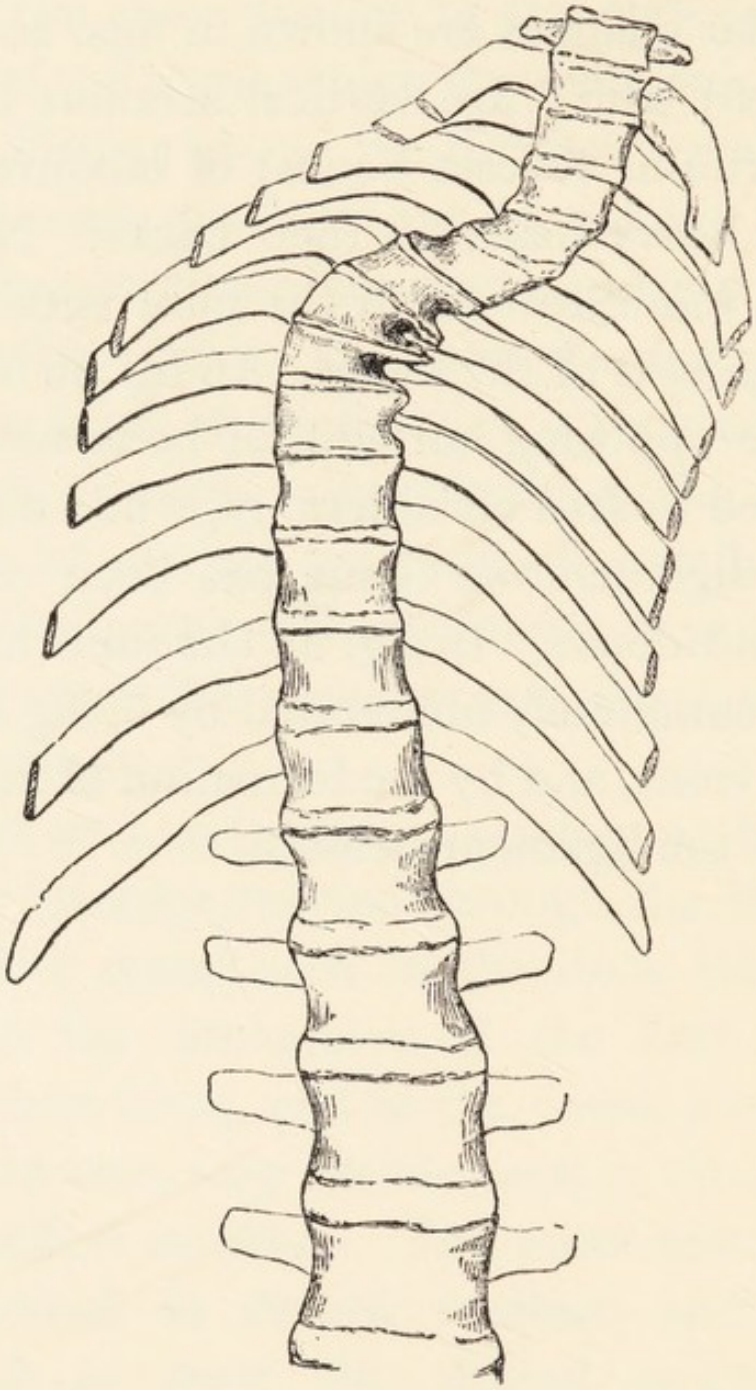


Fig. 7. Spine and ribs of a brewer's drayman.

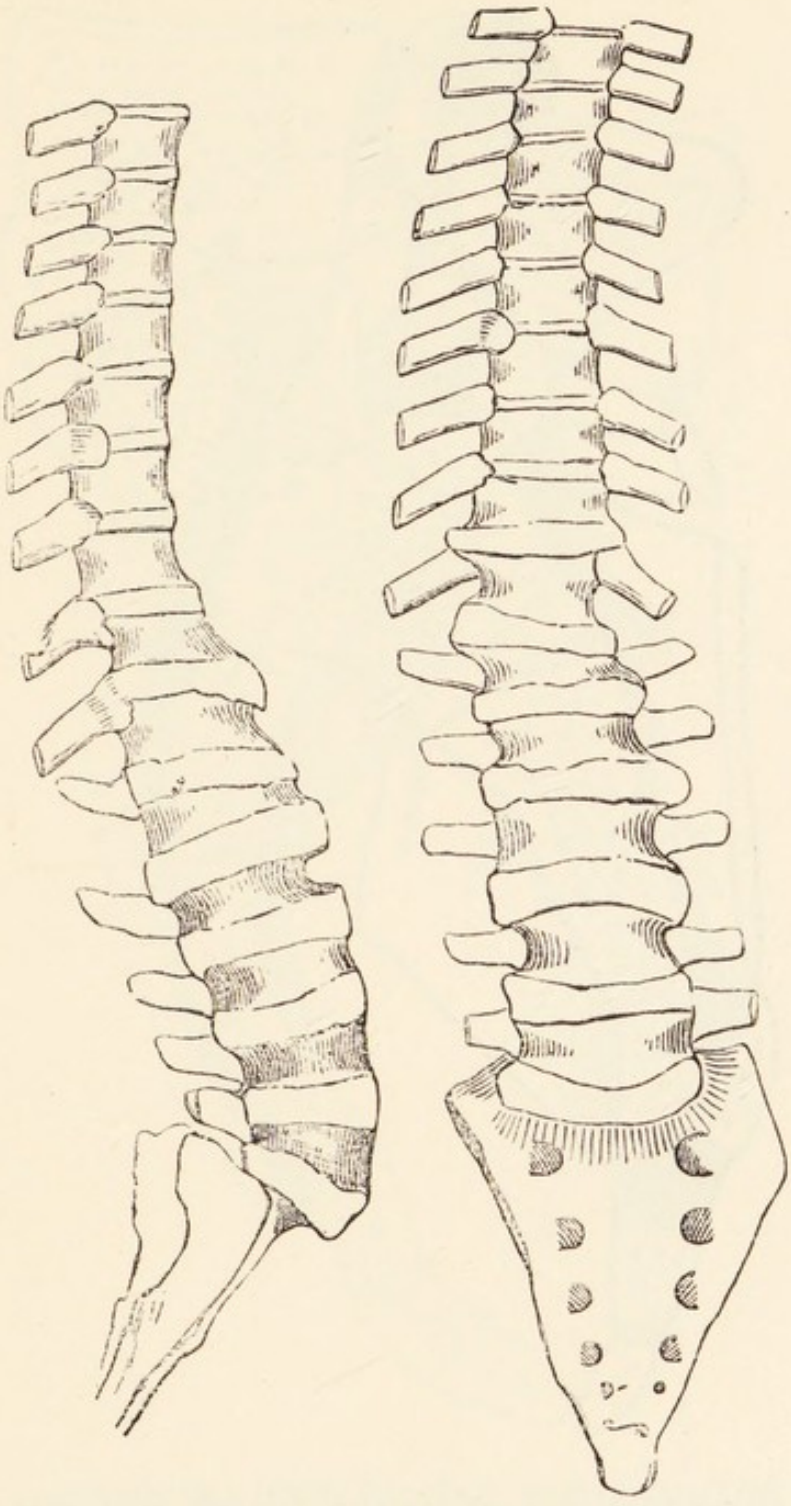


Fig. 8 and 9. Spine of coal-heaver.

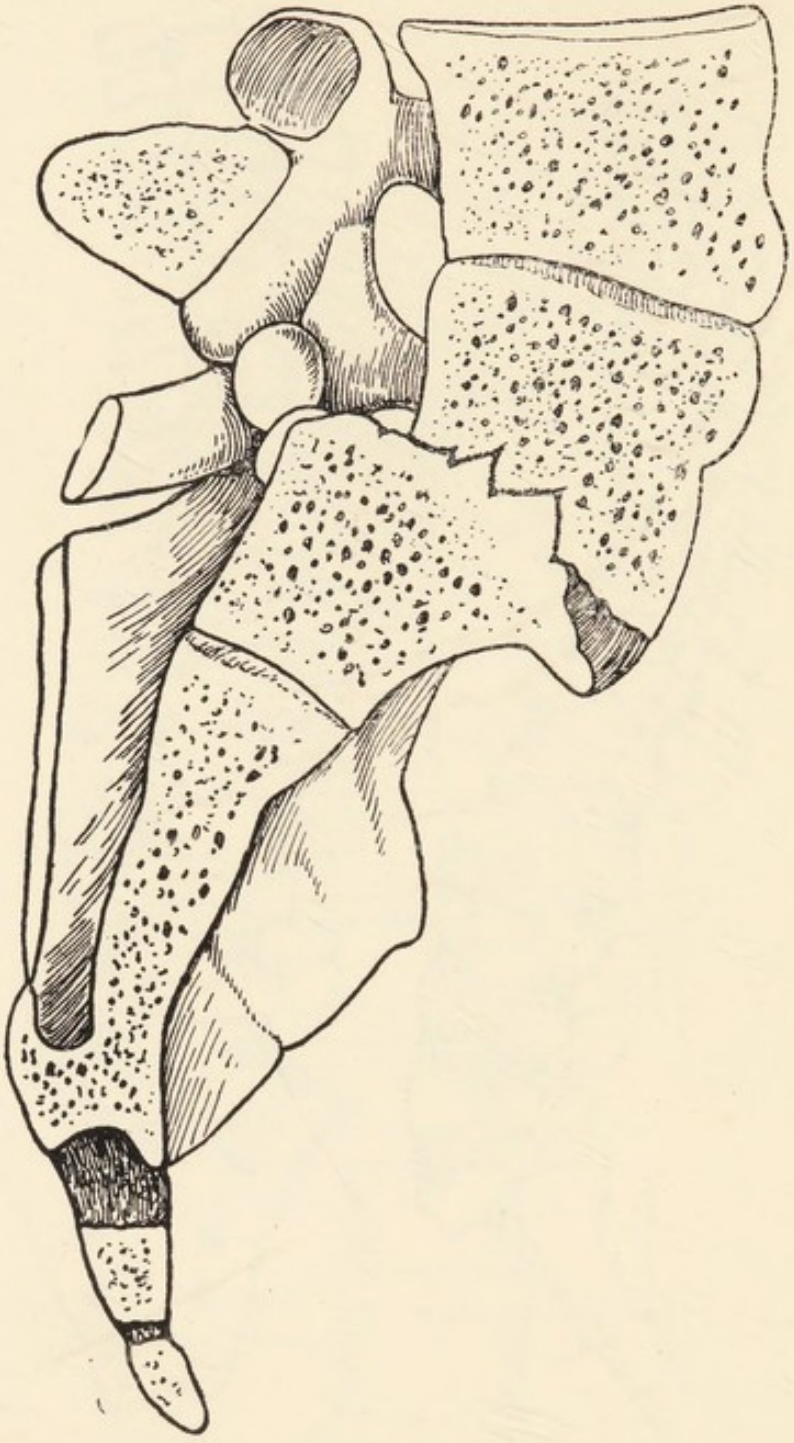


Fig. 10 shows in section the fourth and fifth lumbar vertebrae and the sacrum, the lower extremity of the spinal column, of the coal-heaver.

Fig. 11 shows the fifth lumbar vertebrae and sacrum of the deal-porter.

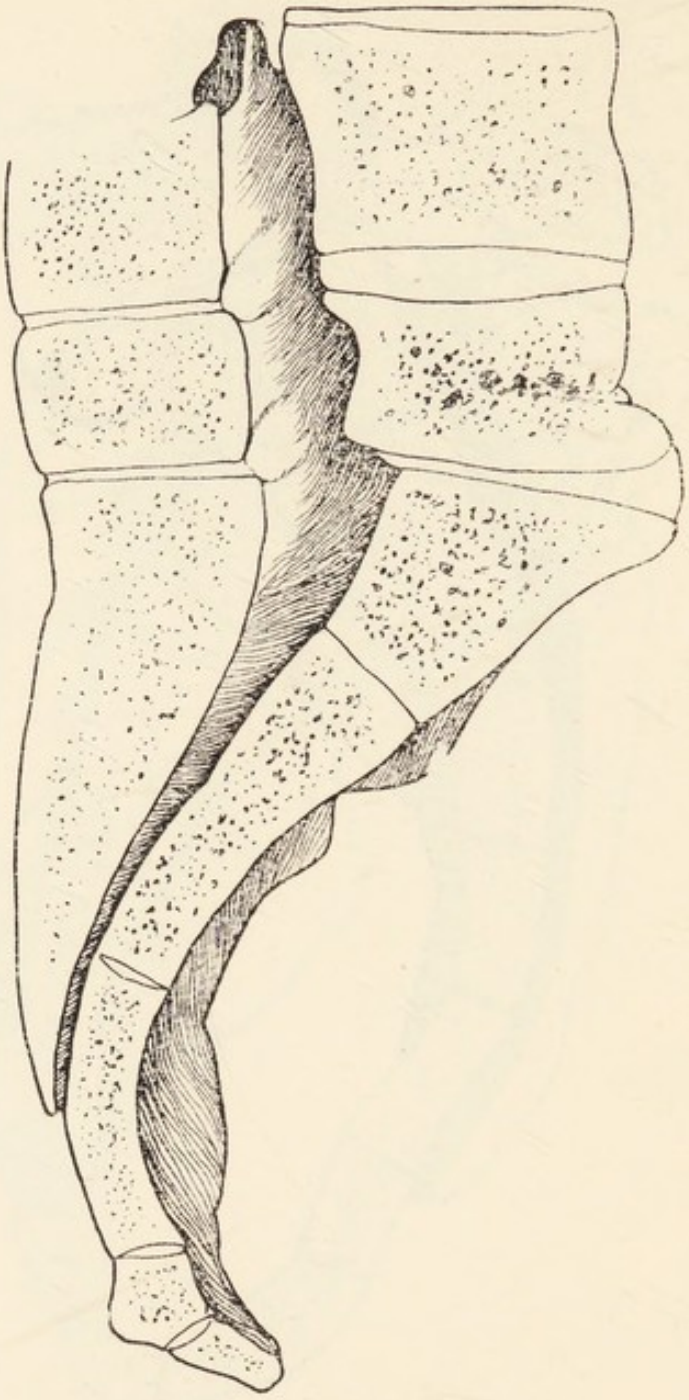
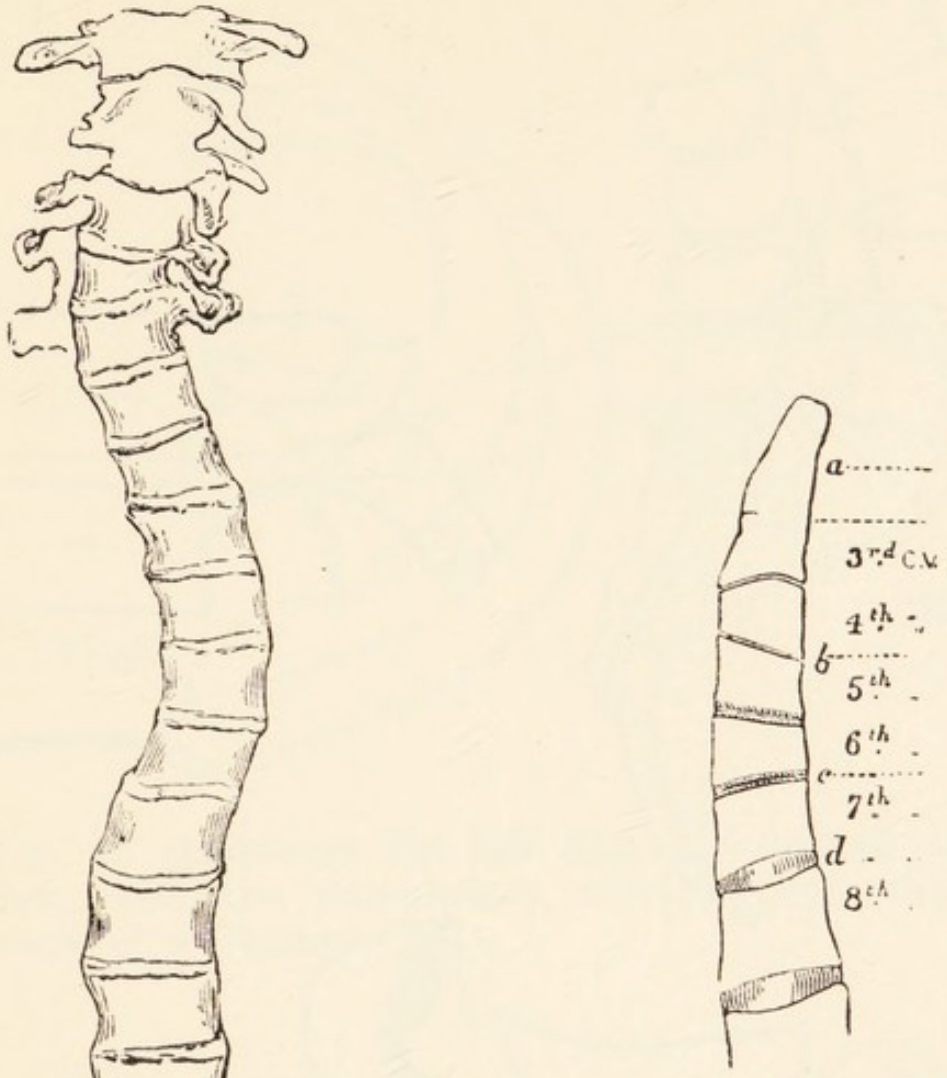


Fig. 12 shows the fourth and fifth lumbar vertebrae and the sacrum of the labourer whose occupation entailed carrying loads in front of his trunk.



Figs. 13 and 14. Spine of labourer who carried loads on his head.

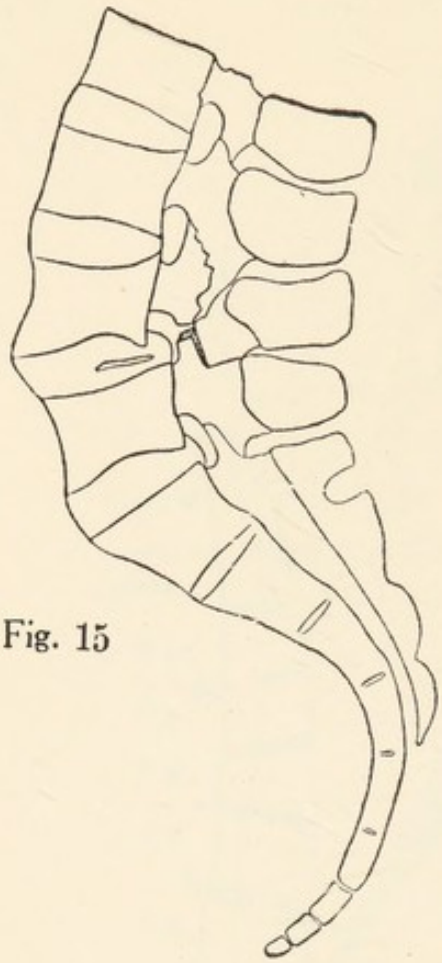


Fig. 15

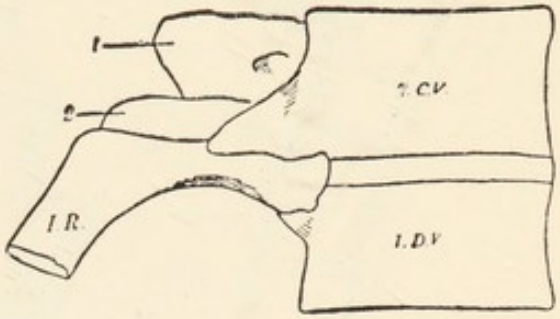


Fig. 16

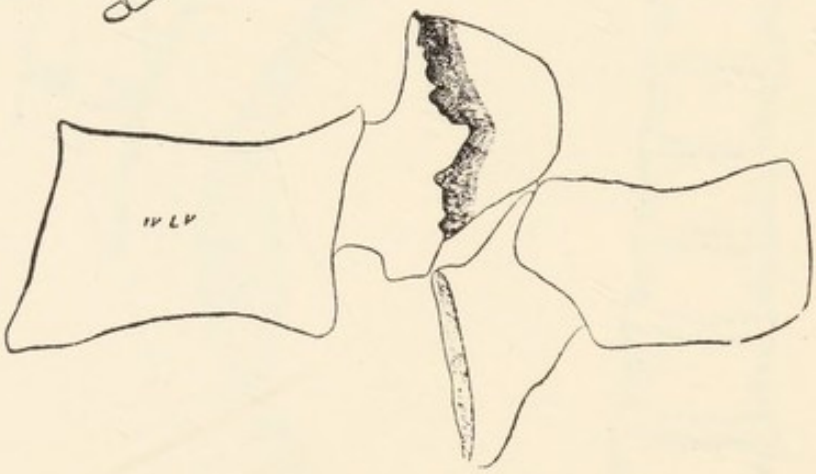


Fig. 17

Fig. 15. Lumbar vertebrae and sacrum of coal-trimmer.

Fig. 16. Seventh cervical and first dorsal vertebrae of coal-trimmer.

Fig. 17. Fourth lumbar vertebra of coal-trimmer.

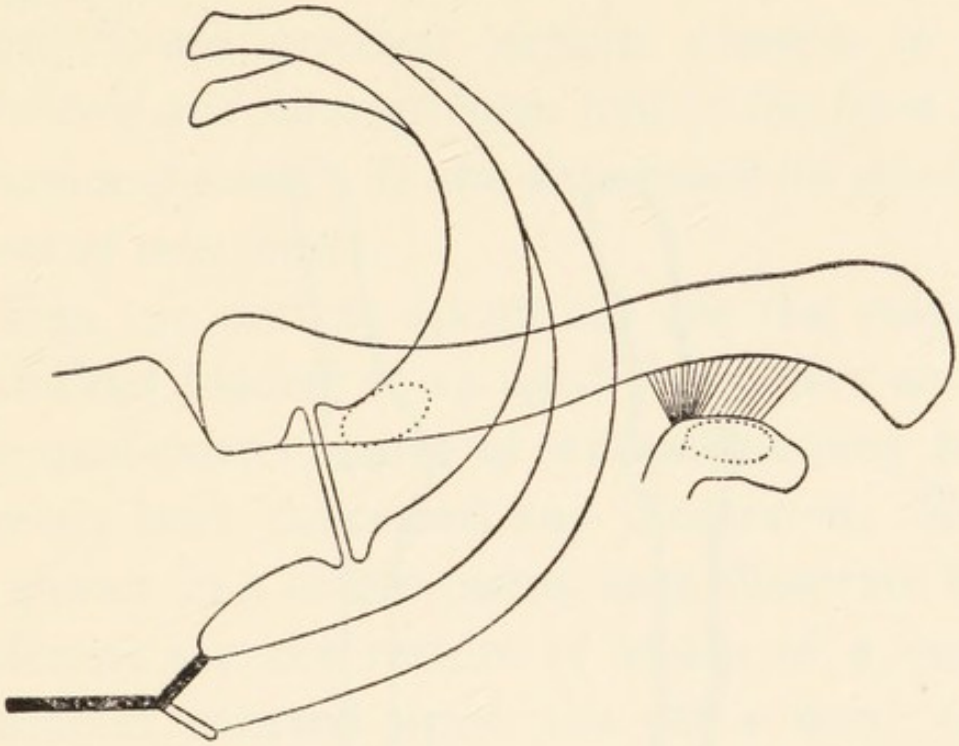


Fig. 18 represents the left first and second costal arches, with the manubrium, clavicle, and coracoid process, of a labourer.

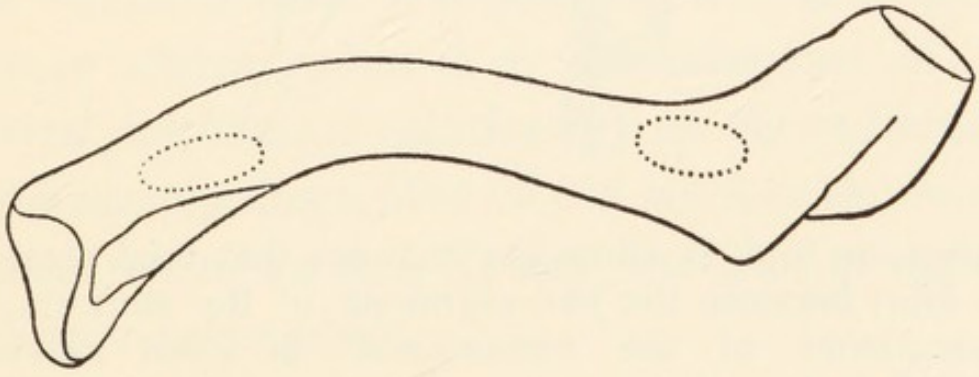
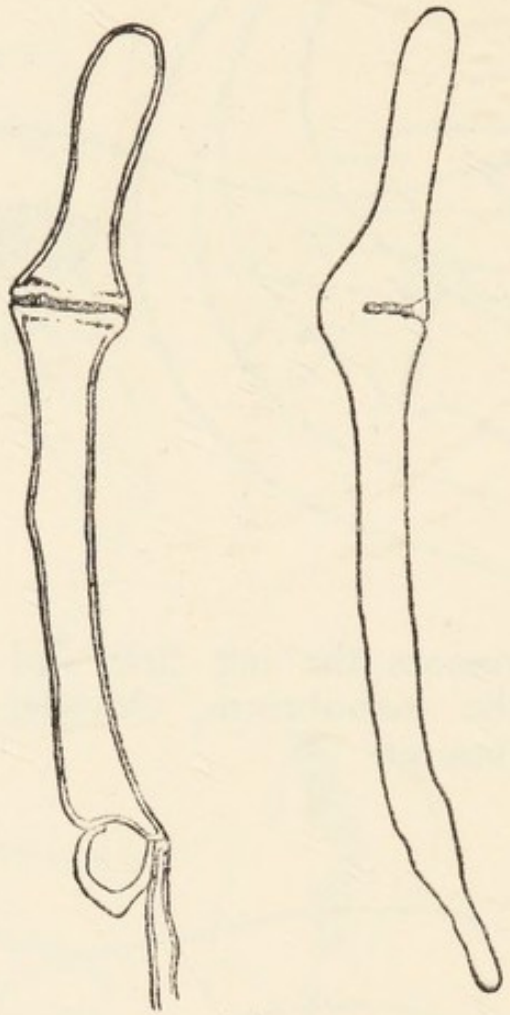


Fig. 19 represents the under surface of the clavicle with the articular facets which correspond with those on the costal arch and coracoid process.



Figs. 20 and 21 show the changes that take place in the joint between the two segments of the sternum, in consequence of the transmission of great pressure through it.

(3) The next law which will be illustrated is that: *Strain produces definite changes in the structure and form of bones and in the form and function of joints. It also determines the development of new joints.*

Figs. 22 and 23 (page 28) are the scapulæ (shoulder blades) of an aged shoemaker and of the deal-porter, parts of whose anatomy have already been described and illustrated. Even as shown in a single plane, they illustrate how different are the results of strain of a varied character exerted upon the same bone continually during the day for a long period of years.

(4) It is now necessary to consider the last law which is that: *Without the exercise of pressure or strain, when it is advantageous to the altered mechanical relationship of the individual to his surroundings, that an old mechanism should be modified or an entirely new one developed, such a change takes place.*

The condition of the elbow joint of the fully developed coal trimmer illustrates the first portion of this law.

Figs. 24, 25, and 26 (pages 31 to 33) are

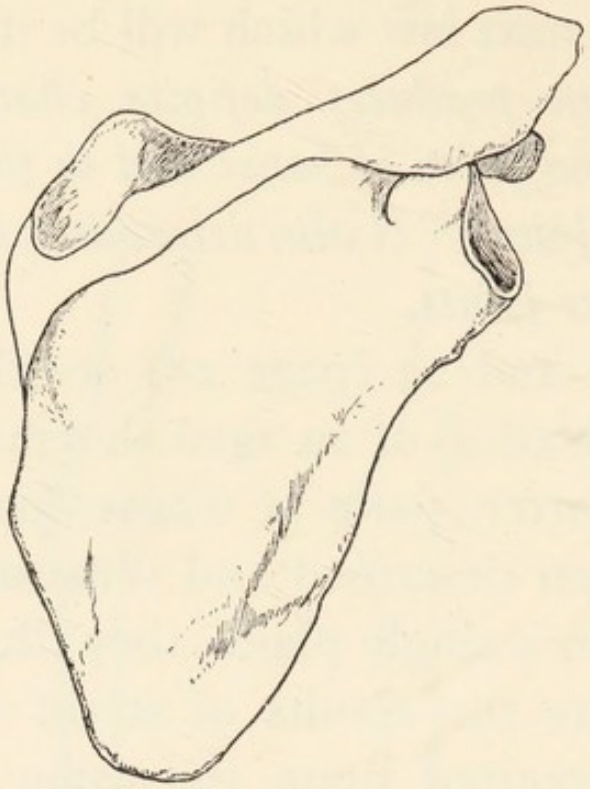


Fig. 22 shows the scapula of a shoemaker.

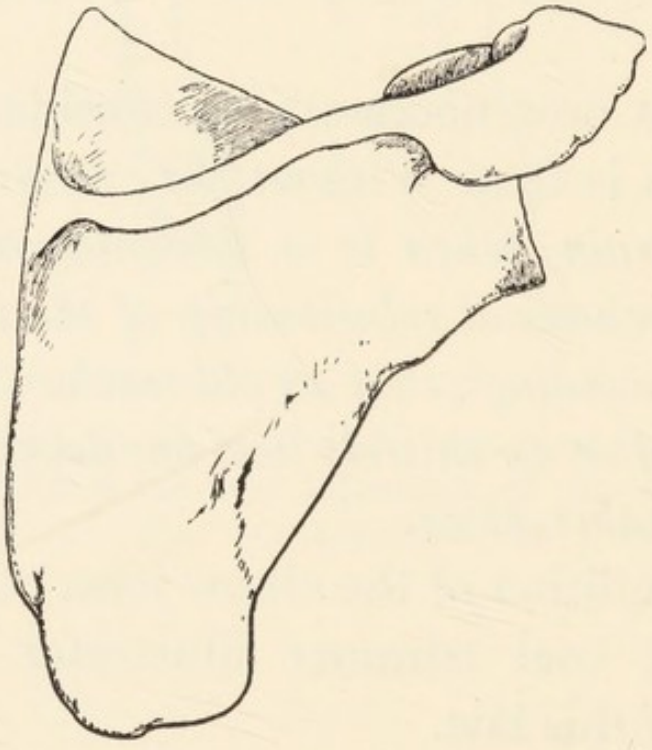


Fig. 23 shows the scapula of a deal porter.

the bones forming the elbow of the coal trimmer. They afford excellent examples of the manner in which an old mechanism can be modified without the exercise of pressure or strain. It is obvious that in the constant movement of limited flexion and extension of the elbow joints in throwing the coal, an enormous expenditure of nerve and muscle energy would be avoided if the range of movement of the elbows was limited to the special requirements of the labourer. This is effected by the deposit of bone in such a manner that the possible range of movement in the joints is limited to the special requirements of the occupation.

An example of the formation of an entirely new mechanism in accordance with this law is shown by the skeleton of an aged shoemaker. Those who have observed a shoemaker at work notice that as he pulls the thread forcibly through the leather, this movement is associated with a twist of the head. This is so generally recognized that in mechanical toys representing the movement of the shoemaker in sewing, this twist of the head forms a part of the sequence.

To avoid the waste of energy requisite to meet the abrupt twist, and clearly without any action of pressure or strain, an entirely new mechanism is developed.

Figs. 27 and 28 (page 34) illustrate the formation of the mechanism as is shown in the development of a pillar of bone from the lateral mass of the atlas (the highest vertebra) to articulate with the under surface of the skull. This forms a most effectual economical structure.

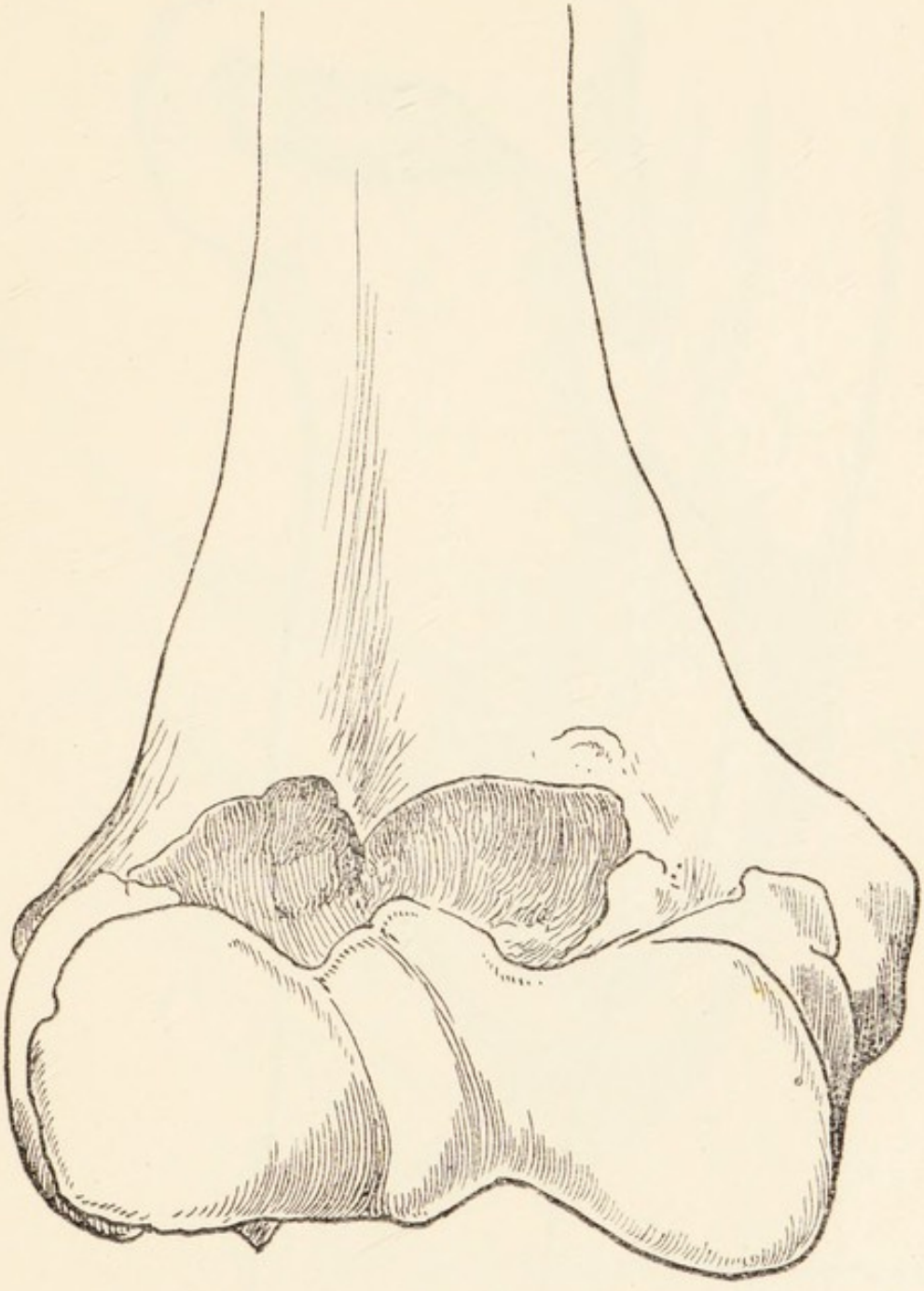


Fig. 24 shows the lower end of the right humerus of a coal-trimmer.

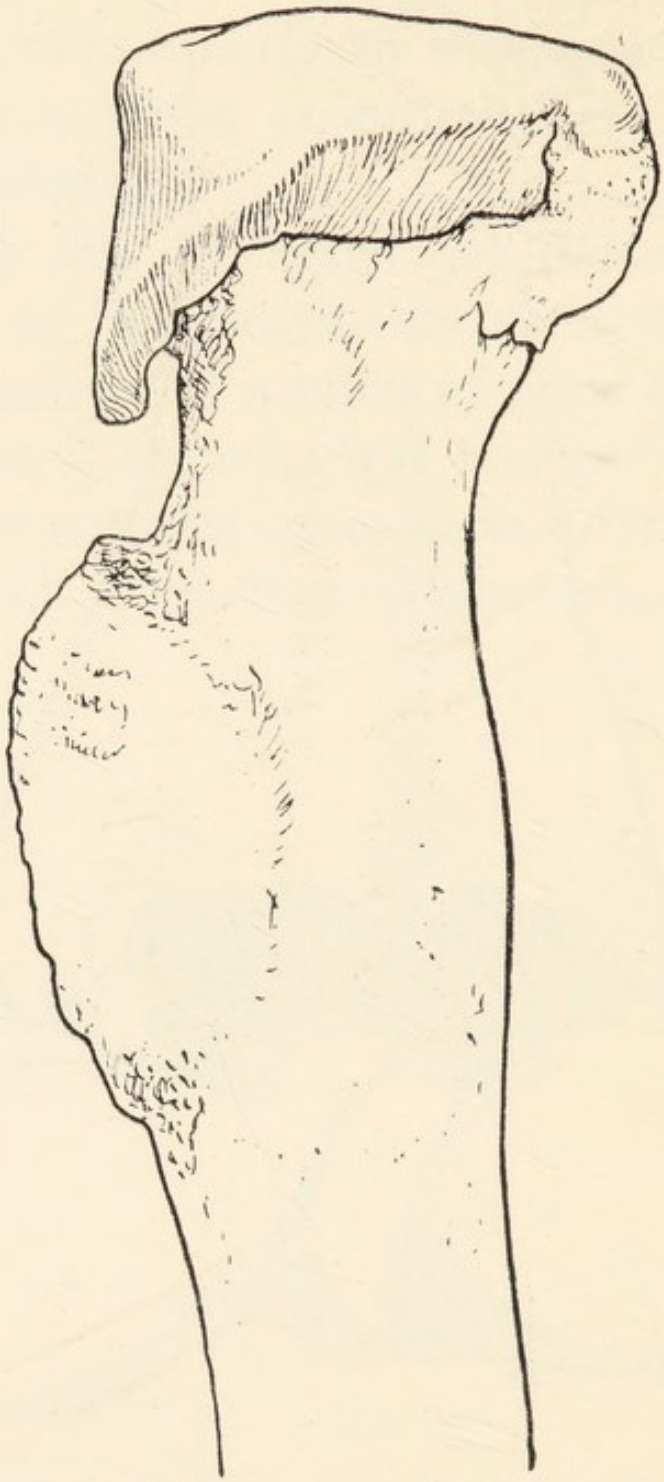


Fig. 25 shows the upper end of the right radius of a coal-trimmer.

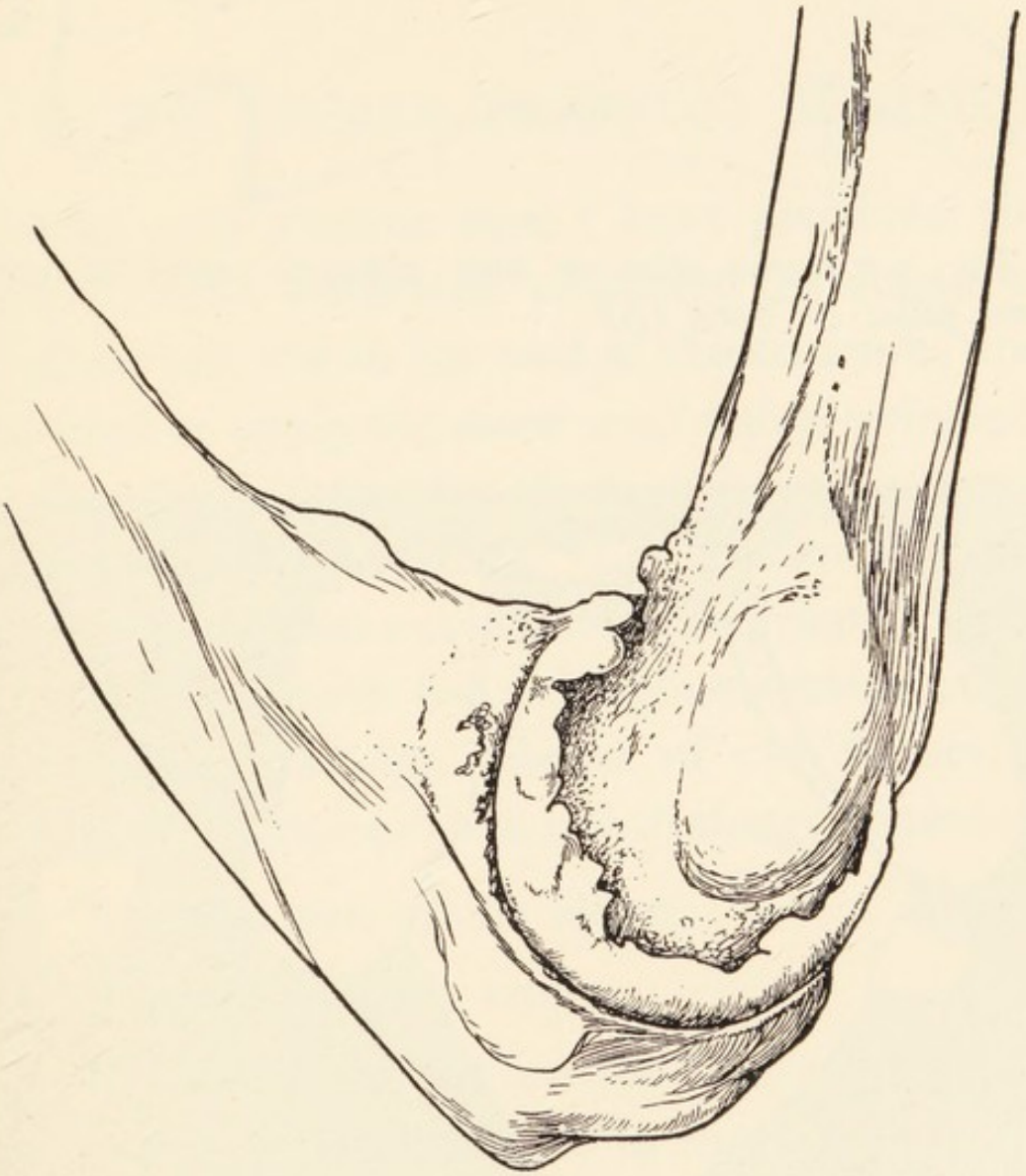


Fig. 26 shows the right elbow joint of a coal-trimmer.

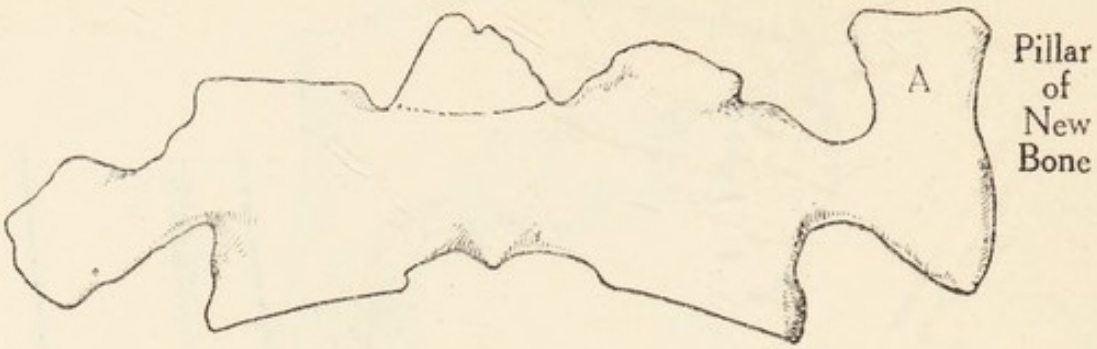


Fig. 27 shows atlas or first cervical vertebrae with new pillar of bone (A)

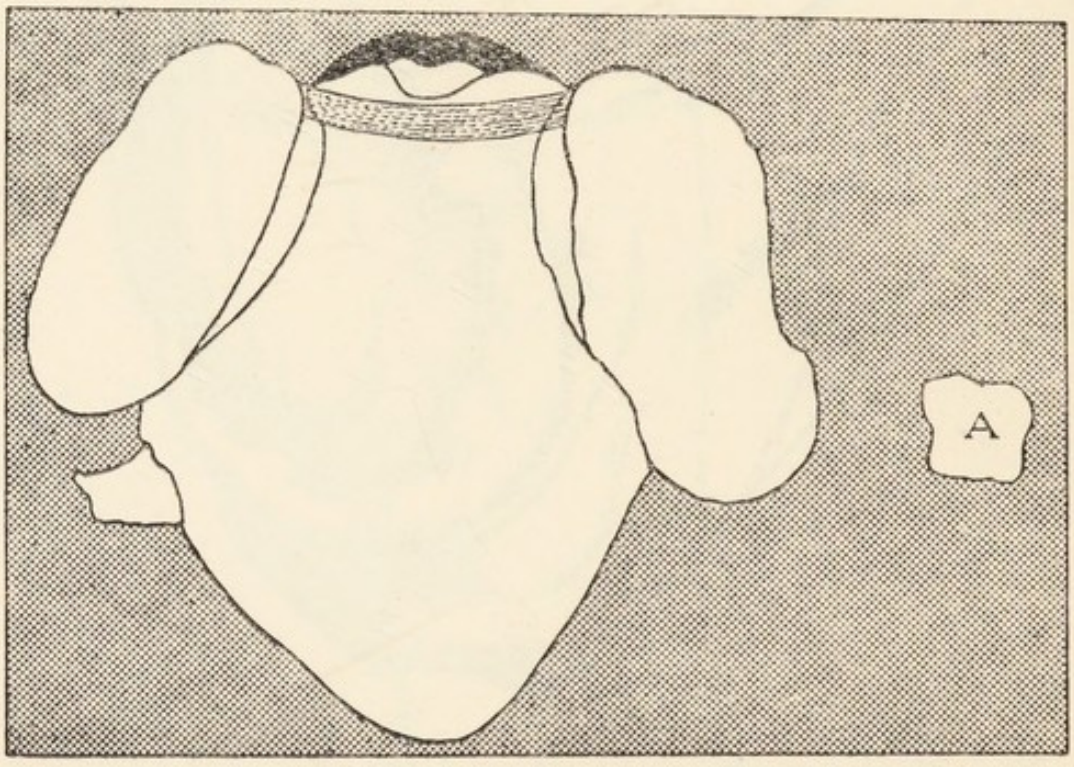


Fig. 28 shows the occipital bone of a shoemaker, with new joint (A).

§2. THE HUMAN DRAINAGE SCHEME

I WILL now assume that I have provided the reader with sufficient objective evidence to support my law in the case of the skeleton, and proceed to apply the same mechanical principle to the gastro-intestinal tract, or in other words to the digestive system. Let us consider the food system from a commonsense point of view, comparing it with the analogous system existing in the drainage scheme of our homes.

Fig. 29 represents a house drainage scheme:

A is the pan of the closet.

B is the syphon trap.

C is the drainpipe leading from the syphon trap to the cesspool in the area.

D is the cesspool which discharges its effluent into the drain in the street E.

Fig. 30 represents the human drainage system.

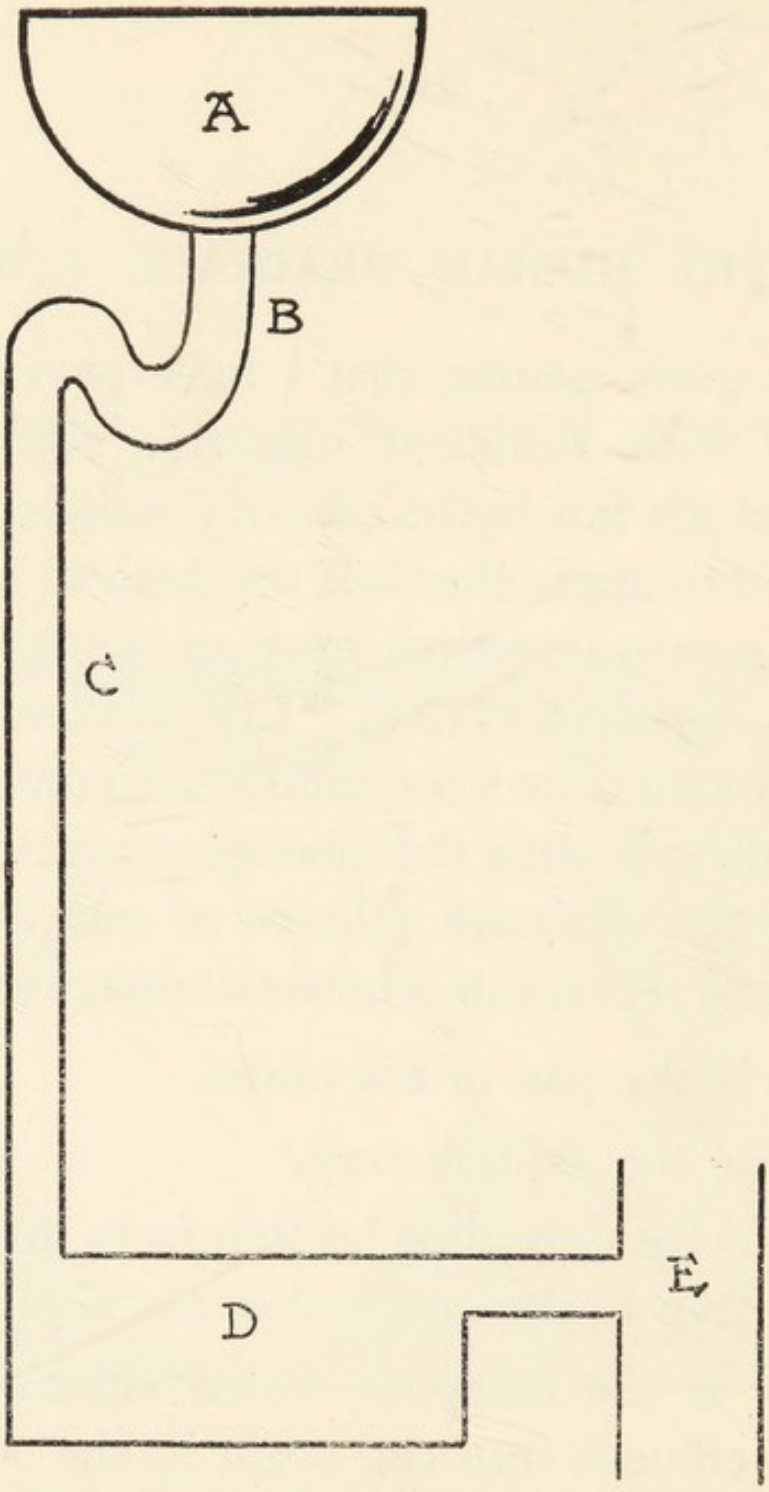


Fig. 29 shows house drainage scheme.

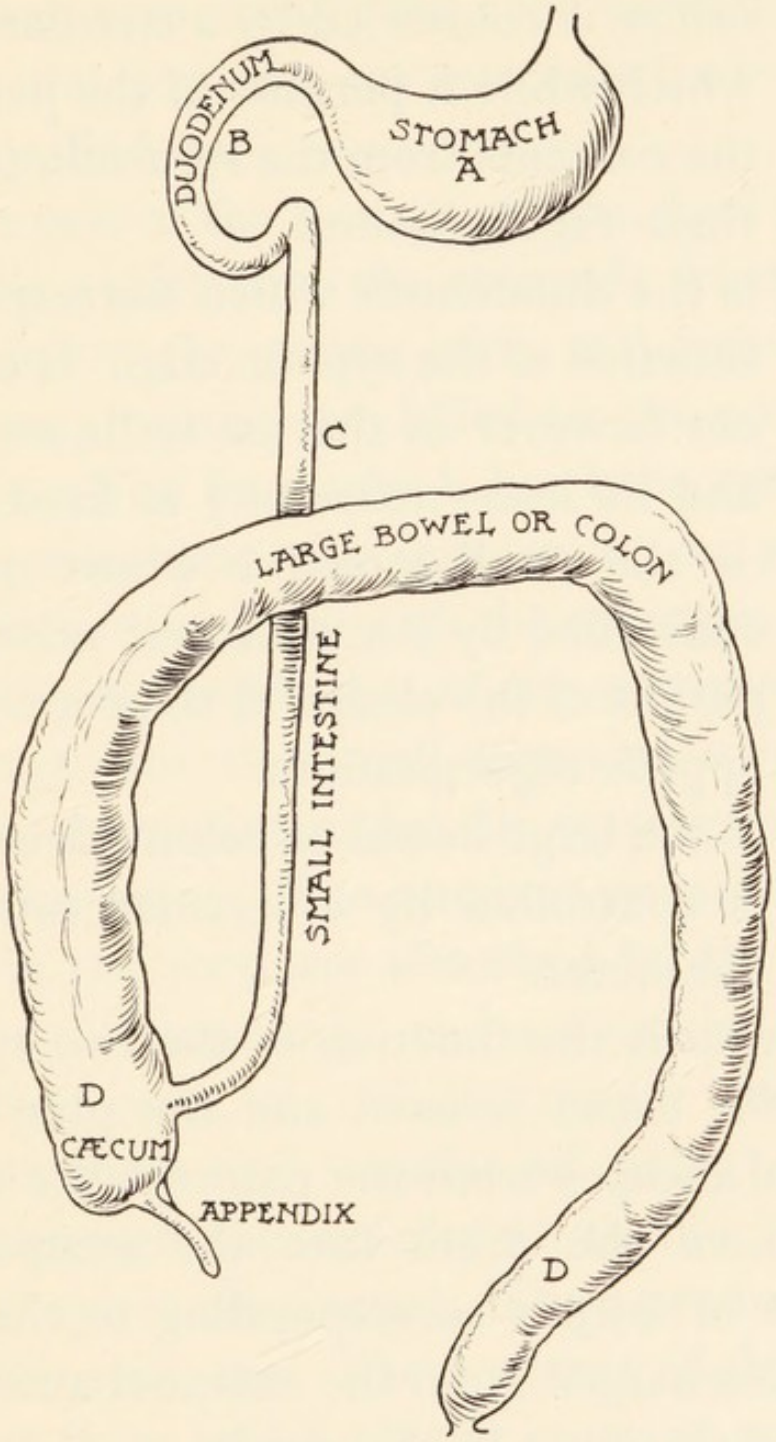


Fig. 30 shows the human drainage scheme.

A is the stomach, a muscular bag whose orifice is controlled by a circular muscle which while it permits of the passage of the contents from the stomach, prevents their regurgitation.

B is the duodenum which corresponds in function to the syphon trap. It is different however in that its walls are elastic and its lower extremity is fixed.

C is the small intestine whose outlet is controlled by a muscle and valve which permit of the escape of the contents but oppose regurgitation.

D is the large bowel or colon whose outlet is controlled by a circular muscle or sphincter.

As regards the function of the two systems, when the closet is used and the plug pulled material escapes from the pan into the syphon trap down the drain into the cesspool, an amount of output corresponding to the input being discharged from the cesspool automatically into the drain in the street.

Any undue control of this effluent leads to the blocking of the cessspool, and to the dam-

ming back of material in the drain and later in the syphon trap: finally the accumulating contents in the pan are not evacuated when the plug is pulled on.

In the case of the human system, food passes down the gullet into the stomach, where it is broken up by the gastric juice, and any organisms it may contain are killed by the action of the juice. The food which has been rendered sterile passes into the duodenum or syphon trap where it is mixed with the secretion of the liver (bile) and with that of the pancreas. It then runs into the small intestine where its digestion is continued by the secretions of its lining membrane. The nutrient materials contained in the food are absorbed by the blood vessels and lymphatics, and are carried to the liver, the cells of which render any by-products inert and capable of being carried safely through the circulation to the kidneys where they are eliminated. Their products are urea, uric acid, etc. The contents of the small intestine from which all the nutrient products have been absorbed pass in a fluid state into the large bowel or cesspool. In the normal course

of events they pass quickly through its length, an amount of fluid being absorbed from them by the blood vessels in a quantity inversely proportionate to its rate of transmission. After a definite period there should be evacuated from the bowel a bulky mass of the consistence of porridge. The amount of the motion evacuated varies in bulk with that of the meal and especially with the amount of indigestible material or roughage contained in the food. The quantity of material expelled from the bowel and the period of its expulsion should vary directly with the input into the stomach and should occur as automatically and regularly as the discharge of the contents of the cesspool of the house into the street drain.

When the digested material has been deprived of its nutrient components and enters the large bowel, it is acted upon at once by myriads of micro-organisms which break up the food residues and convert them into the substance familiar to us as motion. What cannot be too clearly realized is that in the normal healthy individual the change from the sterile contents of the small intestine to that of the

large bowel or colon is abrupt: no organisms whatever exist in health in the former while in the latter they abound in incalculable numbers.

This represents the normal sequence of events in a healthy individual, and so long as this sequence continues no local stagnation or disorder can originate in the gastro-intestinal tract, nor can any degenerative process or disease arise in the several cells composing the body which derive their nourishment from this tract.

A healthy body functions as perfectly as does a motor car which is supplied with good petrol and oil, and has its several parts kept in a state of perfect cleanliness. Such a body or such a car will carry on till the texture of its several parts finally wears out.

§3. CELL IMMORTALITY

I WOULD digress here to call attention to an important point. Every portion of the body is constructed of living cells which perform various functions. They all, however, receive nutriment from the blood stream; they digest that food, and they evacuate into the blood stream the products of their digestion, so that each cell represents in function the body of which it composes the ultimate element.

To impress on your minds the vital importance of removing from the body the products of digestion as soon as possible, and the very serious harm that results from leaving the evacuations too long in the bowel, I would remind you of experiments made by Dr. Alexis Carrel, in the Rockefeller Institute in 1911. He for the first time succeeded in growing living tissues on microscope slides, for

which and other research work he received the Nobel prize. He supplied to these tissues every day a quantity of nutriment. He found that, if he washed away the products of digestion of these cells, in other words the material they evacuated, the cells grew and thrived. If he postponed removing their evacuations, and these were in contact with them for two days, the cells did not thrive so well. If he left the material for three days the cells became languid and feeble, and if he left it for a longer period they died.

You see, therefore, that while a moderate amount of saturation of the cells by the products of their digestion lowered the vitality of the cells, a more prolonged insanitary state resulted in their death, in spite of food supplied to them in abundance daily.

The cells which I saw growing in New York in 1911 are growing and thriving still, and will probably continue to grow indefinitely as long as they are provided with a daily meal and a daily evacuation. In other words there is no such thing as death of living tissue providing its drainage is perfect and it obtains a sufficient

supply of food.[1]

When the drainage of these growing tissues is not properly attended to, the component cells do not die of starvation, but of auto-intoxication. The same applies to humanity generally. While a very small proportion of people living in a state of civilization die of starvation, an immense number die from constipation and its innumerable consequences.

[1] From his experiments with this tissue in the laboratories of the Rockefeller Institute for Medical Research, Dr. Carrel states that two important facts were brought to light:

1. The fibroblasts derived from the original heart fragment manufacture large quantities of new tissue from the substances contained in the culture medium. In 48 hours each cell of a colony seems to divide twice and the colony doubles in volume. Had it been possible to keep all the cells that could have been produced during these sixteen years, their mass would be immense. A colony originally one cubic millimetre in volume would produce approximately one cubic centimetre of tissue in about twenty days. After sixty days the volume of the tissues would be a little more than one cubic metre, and in less than one hundred days one million cubic metres. It is obvious that tissues growing at this rate for sixteen years would reach a volume greater than that of the solar system.

2. Cell proliferation is unlimited in time. To-day the rate of growth of the strain of fibroblasts is as great as it was fifteen years ago. The curve representing the variations of the growth velocity during this long period is parallel to the time axis. Time has no action whatever on these tissues. They are immortal.

§4. MECHANISM OF ORIGIN OF DISEASES OF CIVILIZATION

We will return now to the human drainage scheme. It is obvious that, if an excessive amount of material stagnates in the large bowel, the small intestine is unable to discharge its contents freely into the human cesspool. Consequently the food which is being digested in it accumulates, and renders its coils very heavy. The traction they exert in *the erect posture* upon the end of the syphon trap or duodenum is sufficient to kink the elastic bowel at this fixed point and so to obstruct its effluent.

Fig. 31 (page 46) shows the kinking and consequent obstruction of the effluent from the syphon trap or duodenum which results from the drag of the heavy overloaded obstructed small intestine upon its fixed extremity. The

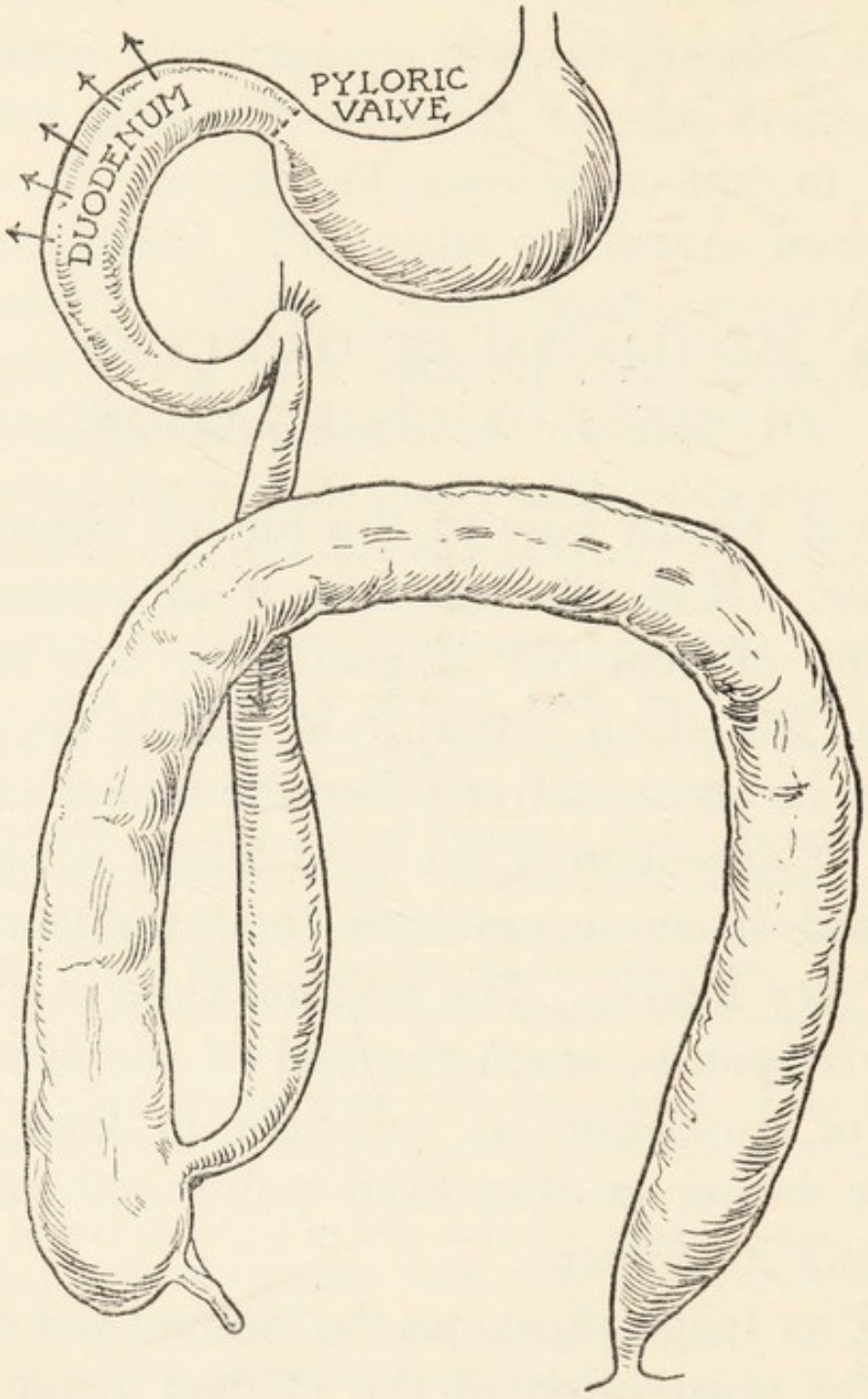


Fig. 31 shows the kinking of the duodenum resulting from the drag of the overloaded small intestine.

arrows indicate the strain which in these circumstances is exerted upon the wall of the duodenum.

The stomach continues to expel its contents into the duodenum, and as they cannot regurgitate into the stomach because of the contraction of the muscle controlling its orifice, the tension in this segment of the bowel progressively increases and produces that pain in the pit of the stomach so familiar to people suffering from constipation. Should this strain be increased beyond a certain limit, the over-stretched mucous membrane tears and bleeds, and later an ulcer is developed at the seat of greatest strain.

This ulcer may perforate the coats of the bowel and burst, when death will ensue unless the condition is promptly dealt with surgically.

However, this ulcer never remains sufficiently long to become infected by cancer, for the reason that the stomach becomes dilated and, in proportion as it does so, it ceases to exert the same powerful pumping action, thus reducing the tension in the duodenum and permitting the ulcer to heal.

Fig. 32 shows how this over-distension of the duodenum or syphon trap of the digestive system is overcome by a spasmodic action of the pyloric muscle. The obstruction so produced exposes the mucous membrane in its vicinity to damage from the forcible impact of the stomach contents upon it, with the result that ulceration, and later cancer, may ensue.

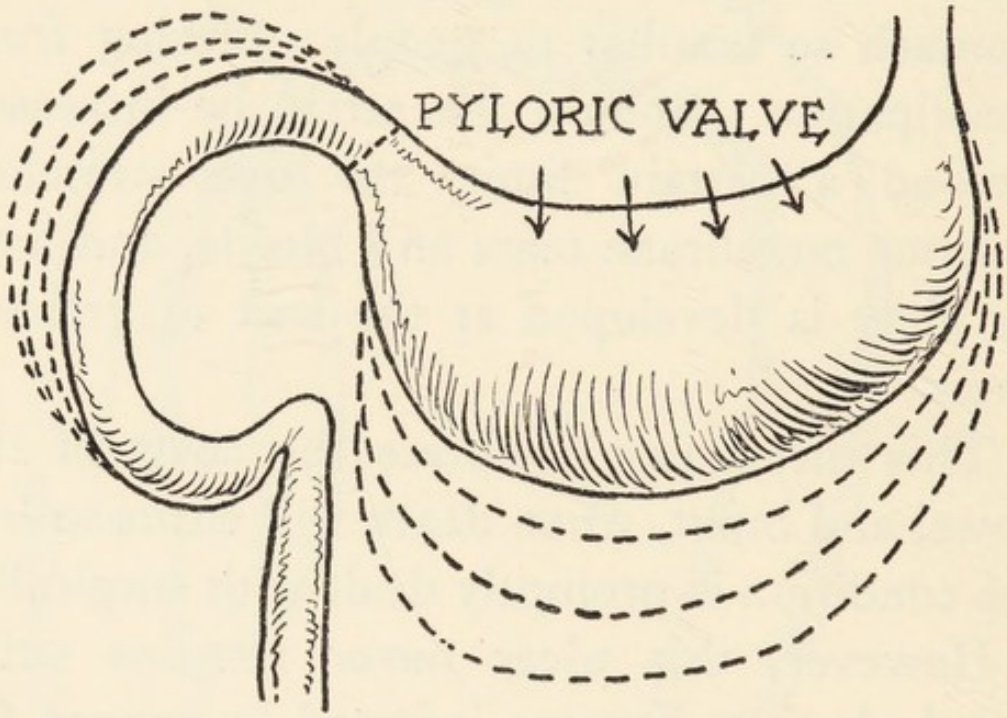


Fig. 32 shows the manner in which stress is exerted upon the duodenum when its end is kinked, resulting not only in distension of the duodenum but also of the stomach.

The strain consequent on the weight of its contents is sustained by the upper margin

of the stomach, as indicated by the arrows. In proportion as the stomach dilates, as indicated by the dotted lines, so does the distension of the duodenum gradually subside. Unfortunately, owing to the dilatation of the stomach and the accumulation of its contents, the excessive strain on the upper part leads to engorgement of its mucous membrane and later to ulceration.

Unless treated medically or surgically, this ulcer remains chronic, and, if so, is exceedingly liable to become infected by cancer.

Besides these mechanical results of the stagnation of the contents of the large bowel, or in other words of constipation, there is associated with them an infective process.

The matter collecting and stagnating for an excessive period of time in the big bowel or cesspool becomes permeated by an excessive number of the micro-organisms which normally inhabit this portion of the bowel and which tend to assume an unusually virulent type; or other more dangerous micro-organisms may develop in the decomposing contents. These micro-organisms irritate and inflame the mucous membrane, causing painful spasm of the muscle wall, and this inflammatory process

readily involves that little worm-like body the appendix. Indeed, it is not unusual for the symptoms resulting from inflammation of the appendix to be the first serious evidence of the effects of constipation.

This infection of the stagnating contents of the colon by virulent micro-organisms is most marked in its commencement where the contents tend to stagnate longest. These micro-organisms readily escape from the large bowel and entering the end of the small intestine grow there rapidly in its sterile contents. In proportion as the level of infection of the material in the small intestine, from which the body obtains its nourishment, rises, in that degree is there picked up by the blood vessels and lymphatics a larger amount of micro-organisms and of deleterious matter than the liver is able to deal with effectually. In consequence of this impregnation of the blood, there is carried by the circulation to every cell in the body blood impregnated more or less extensively with micro-organisms and with the toxins or poisons they produce. These annoy and irritate the cells in the kidney by which they

are eliminated and the surface of the lining membrane of the bladder and kidneys over which they pass, and much disease arises in consequence.

The thyroid and other ductless glands become more active in order to stimulate the several tissues to deal with these by-products. The thyroid plays the part of the governor of an engine and regulates the functions of the body. It frequently becomes enlarged because of the unusual work entailed, and its tissues undergo various degenerations. The impure blood supplied to the several cells composing the body, and the consequence of their impaired drainage, *just as in the case of Dr. Alexis Carrel's experiment*, lowers their vitality and resisting power, so that they are very liable to become invaded by micro-organisms and toxins which could not for an instant affect or secure a foothold in a healthy soil, and disease and degeneration result in consequence. The particular part of the body which suffers most from the results of imperfect nutrition of its component cells varies greatly with the age of the individual. Such evidence of malnutrition

as is comprised under the term rickets occurs very early in life. In later life arise infection of the lymphoid material of the nose, throat and tonsils, of the middle ear, and of the lungs; pyorrhœa and rheumatic infections with associated heart troubles; tuberculosis commencing most commonly in the glands draining the infected end of the small bowel; colitis, appendicitis, ulcers of the duodenum and stomach; degeneration and inflammatory changes in the womb and ovaries, and in the female breast; degenerative changes in the prostrate, kidneys, the heart and blood vessels; rheumatic gout; and finally, when the tissues of the body have been supplied for a sufficient length of time with a foul blood, some degenerated organ or tissue forms a soil suitable to become infected by cancer. Syphilis, like constipation, causes the degeneration and lowered vitality of every tissue, and plays an important accessory part in increasing the liability to cancer.

Always remember that cancer never affects a healthy organ, so that it and a vast number of other diseases may be avoided by keeping every part of the body in perfect health.

§5. HEALTH IN NATURE AND IN CIVILIZATION

LET us consider firstly how a state of perfect health can be brought about, and secondly what are the factors which are responsible for bringing about a state of ill health.

To find races which are quite free from constipation and all its dire consequences it is necessary to consider such as are uncontaminated by association with the food and habits of the white man.

Enlightenment on this subject is afforded by perhaps the most expert observer in dietetics, Colonel McCarrison, who is employed by the Indian Government to study food in relation to health and disease. He writes as follows:

'For nine years of my professional life my duties lay in a remote part of the Himalayas, among isolated races, far removed from civiliz-

ation. Certain of these races are of magnificent physique, preserving until late in life the characters of youth; they are unusually fertile and long-lived, and endowed with nervous systems of notable stability.

'During the period of my association with these people (nine years) I never saw a case of asthenic dyspepsia, of gastric or duodenal ulcer, of mucous colitis, or of cancer, although my operating list averaged over 400 operations a year.'

This statement is irrefutable and records the experience of one of the most able and practical researchers in the world, who combines a very thorough laboratory knowledge with an extensive medical experience, a combination which is as ideal as it is rare among researchers.

Further evidence is afforded by Dr. Ernest H. Tipper who was in the West African Service. It is contained in a book written by him entitled *The Cradle of the World and Cancer, A Disease of Civilization.*

It is particularly important as showing that both conditions which are so familiar to the public, namely appendicitis and cancer, do not

exist among virgin communities who eat proper food and have natural habits.

'The average daily number of cases seen during my *twenty years service* in West Africa was about sixty, exclusive of official rating, yet I only saw six cases of cancer altogether; five of these were in coast stations, the other one away in the grass country, *but not one amongst those two million people in the heart of the Niger Delta*: and I only once came across a case of appendicitis *when in charge of a coast station*, and that was not a clear case.' And again he states: 'The Equator is the cradle of the world, and amongst the race of which I write, *where conventionalism is absent and food perfectly natural and abundant*, where the natives have never lost touch with the first principles of feeding, and *there is no such thing as constipation*, *there is NO cancer*. At the first dawn of civilization amongst them this disease makes its appearance; where civilization is advanced, it is rife.'

'In the case of cancer, *constipation* and *excessive meat eating* should be the two sus-

pects; when they are present cancer is rife, where absent there is none.'

This association between meat eating and cancer is well shown in civilization by the prevalence of cancer among the short-lived butchers and its comparative rarity among the long-lived clergy and farm labourers who eat very little meat.

These same natives of Africa when placed in intimate association with members of a white race gradually acquire their diet and habits, and in proportion as they do so they become affected by the diseases which may be best designated as the *diseases of civilization*.

In Chicago the coloured population suffers from cancer in the same ratio as do their white brothers.

As showing the effect of diet on health we have the experiment made by Hindhede not upon a limited number of monkeys, rats, and other small animals, but upon an entire nation. It is impossible to exaggerate the importance of Dr. Hindhede's achievement in view of the prevention of disease. Too much stress cannot be laid on the value of the measures he adopted

because of their perfect simplicity and of the facility with which they can be followed in this country, with a certainty that, by adopting them, disease may be rapidly reduced, and the nation can be transformed from a C3 to an A1 type.

§6. LESSON OF THE DANISH WAR RATIONING

DENMARK was spared participation in the war, but it nevertheless felt its effects acutely. The country was placed in a very awkward position by the complete blockade from February, 1917. Normally it grows yearly 1,100 million kg. of rye, wheat, and barley. It imports 1,500 million kg. of rye, wheat, maize, and oilcake. Its consumption of these amounts to 2,600 million kg.

In 1917 the importation of the 1,500 million kg. was stopped, and on account of the drought Denmark lost 300 million kg. of its normal crop. It had therefore only 800 million kg. for its food for the year instead of the 2,600 million kg. normally required for the people and domestic animals.

While the situation was difficult, the solution of the problem was nevertheless extremely

easy. Dr. Hindhede realized that it was impossible with the limited food supply to keep men and animals alive. He therefore reduced the number of pigs to one-fifth, and reserved their food of barley and potatoes for the people. In addition he diminished the cows 34 per cent., and withheld the wheat-bran from the cows and incorporated it in the coarse rye bread. He thus obtained a bread which not only contained all the rye bran but 12-15 per cent. of wheat bran extra. It was indeed the coarsest bread ever seen. He thus arrived at an impossible diet according to the old dietetic teachings, but an ideal one according to his new theory. The following figures show the diet which everyone could get daily at a cheap price:

	gm.
Meat	40
Butter	37
Milk (adults)	3–400
Bread	270
Flour and groats	150
Potatoes	500

It should be stated that the well-to-do class could buy more beef in the open market, but as

it was very dear it was beyond the means of the poorer members of the community.

The results to health of this extremely Spartan diet was striking in the extreme. The mortality for the whole country in the first full rationing year, October, 1917–October, 1918, fell 17 per cent., indicating a mortality of 10.4 per thousand, *the lowest death-rate ever seen in any country*. In the last three months of 1918, however, influenza appeared, which affected the percentage of mortality. It is however striking to note that Denmark was the only European country which had no higher mortality in 1918 than in the years preceding the war. Excluding the belligerent nations, the statistics of some of the countries who were not involved in the war afford the following:

Death-rate per 1,000 living

1 Denmark	1908–13	13.3	1918	13.1	fall	2 per cent
2 Norway		13.5		16.7	rise	24 per cent
3 Sweden		14.1		18.0	,,	27 per cent
4 Holland		13.6		17.1	,,	26 per cent
5 Spain		23.0		33.6	,,	46 per cent
6 Switzerland		15.2		19.0	,,	25 per cent
mean 2–6						30 per cent
mean, without Spain						25 per cent

There is no reason to doubt that, under normal conditions, influenza, which raged furiously on the Continent, would have put up the death-rate in Denmark to the same extent as in the neighbouring countries. But the Danes were saved this 25 per cent. by their efficient rationing and by the consequent increased health, vitality and resisting power to disease of the people. The consumption of spirits fell to one-twentieth and this also played an important part in the improvement of health especially in the case of men of middle age.

It is obvious from this experience in Denmark that a diet consisting mainly of dairy produce and vegetables is not only the most healthy but also the cheapest; but how difficult it is to induce the public generally to grasp the truth of this fact!

Not only did the very thorough measures which were taken by Dr. Hindhede lower the death rate in an extraordinary manner, but they also improved the resisting power to infective diseases such as influenza. The statistics given show that this nation suffered in almost a

microscopical way as compared with other nations.

We learn from Dr. Hindhede's gigantic and successful experiment upon an entire nation that, by improving through dietetic measures the health and consequently the resisting power of the component parts of the bodies of the people to their invasion by organisms, not only is the incidence of the diseases peculiar to civilization reduced in a remarkable manner, but the individual is protected very largely from those epidemic complaints such as influenza, which attack indiscriminately both uncivilized and civilized races.

§7. FAULTY HABITS OF CIVILIZATION AND THEIR CONSEQUENCES

Now let us endeavour to discover what are the factors present which render the vigorous and robust natives of the Punjab and of Benin immune to the many diseases of civilization, and whose absence results in the existence of these diseases in communities in proportion as they become civilized, in spite of the fact that by hygienic measures the latter have been freed to a remarkable extent from those complaints to which natives are liable, largely owing to climatic conditions. I refer to such diseases as plague, cholera, malaria, black water fever, typhoid, typhus, sleeping sickness, etc., which destroy huge numbers of natives.

I trust that I shall be able to show that the laws governing the results of any deviation from our mechanical surroundings will afford a complete solution of the problem.

When the vigorous native woman nurses her child, which she does till it is able to partake of the food of the community, at an interval after each suckling the infant evacuates a motion, as certainly as does the cesspool of the house discharge an amount corresponding to the input into the pan of the closet when the plug is pulled.

This continues during the lifetime of the child and later during adult life, the evacuations corresponding in number to that of the meals. Since the diet of the native comprises a much larger proportion of roughage than does the diet of the civilized person, his excrement is correspondingly more bulky. The diet of our next of kin, the gorilla, contains vastly more roughage: the excrement of the male gorilla passed during one night is stated by Mr. Sharp to weigh twenty-five to thirty pounds. These facts show how dependent the intestine is upon roughage for the satisfactory performance of its function as a drain.

The conclusion I wish you to draw is that the bulk of the contents of the end of the large bowel bears a direct quantitative relationship to a previous meal.

In civilization the mother is very rarely able to provide the child with the food that nature expects her to supply for such a length of time as does the native woman, and she supplements her disability with the milk of cows, goats, or asses, or, failing that, by some artificially prepared product. To this imperfect physical development of the function of the breast the Jewish mother is usually a noted exception.

The inability of the woman in civilization to provide sufficient good milk for her offspring is due to her comparatively defective sexual development, to her unsuitable food and habits, to the absence of sunshine and to want of exercise. For instance, while the civilized woman dances with her legs, the native woman dances with her trunk, every movement performed having as its object the stimulation of the intestines into activity. *To the native constipation is anathema.* In any case, whether the civilized mother nurses her infant or supplies it with some substitute during the months it wears a napkin, it evacuates the contents of its bowels more or less regularly, the mother taking no active part in limiting the number of

motions. Owing to the defective nature of her milk or some artificial substitute the child's bowels are usually sluggish, and the mother is in the habit of employing drugs or some other artificial means to ensure their acting.

In any case, comparatively early in the life-time of the child the parent commences to 'regulate the child's bowels'. By this is meant that she considers that one action of the bowel in a day is sufficient for health, and she usually regards the morning as being the most suitable time for the purpose.

Let us consider the mechanical result of this control. The end of the large bowel has been evolved for thousands of years to accommodate an amount of material which bears a certain proportion to the input. The single evacuation entails that the result of twenty-four hours digestion shall stagnate in this section of the bowel. Should such an event take place, this portion of the intestine becomes elongated, dilated, a great loop being formed which, puddling in the pelvis, forms a serious obstacle to the passage of material through it. To avoid this abnormal mechanical relationship of the

individual, nature forms bands or membranes, which are practically crystallization of lines of force (see figs. 33 and 34, pages 68 and 69). These gradually secure the outer surface of the suspending layer in which the blood vessels and lymphatics run to this piece of bowel, thus interfering materially with its function and its capacity to transmit its contents. Later these bands grip the bowel itself, and fix it to the back wall of the abdomen, still further exaggerating its disability to permit of the passage of material through it, by diminishing its calibre. This obstruction to the passage of material, and the consequent inability to retain the product of twenty-four hours digestion, entails the accommodation of the balance in the large bowel proximal to its anchored segment. This abnormal overloading of the bowel causes the development of bands or membranes, crystallized lines of resistance, at several points, as indicated in fig. 34. These latter reduce the lumen of the canal at these points, and further impair the free passage of material through them.

Fig. 33 indicates what would happen if it

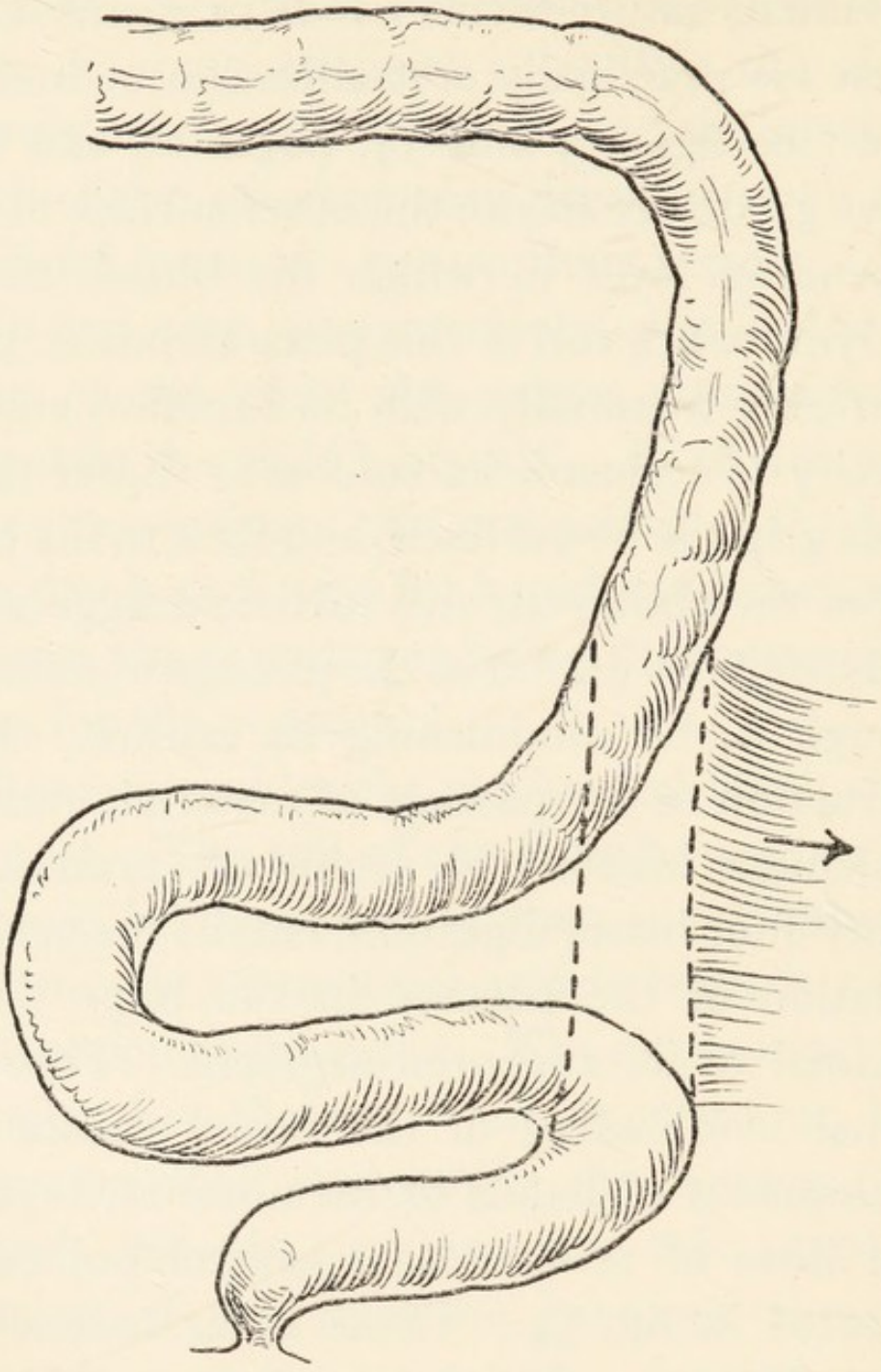


Fig. 33 shows a section of the bowel anchored by a band to meet the altered mechanical relationship subsequent to the accumulation of the products of twenty-four hours digestion.

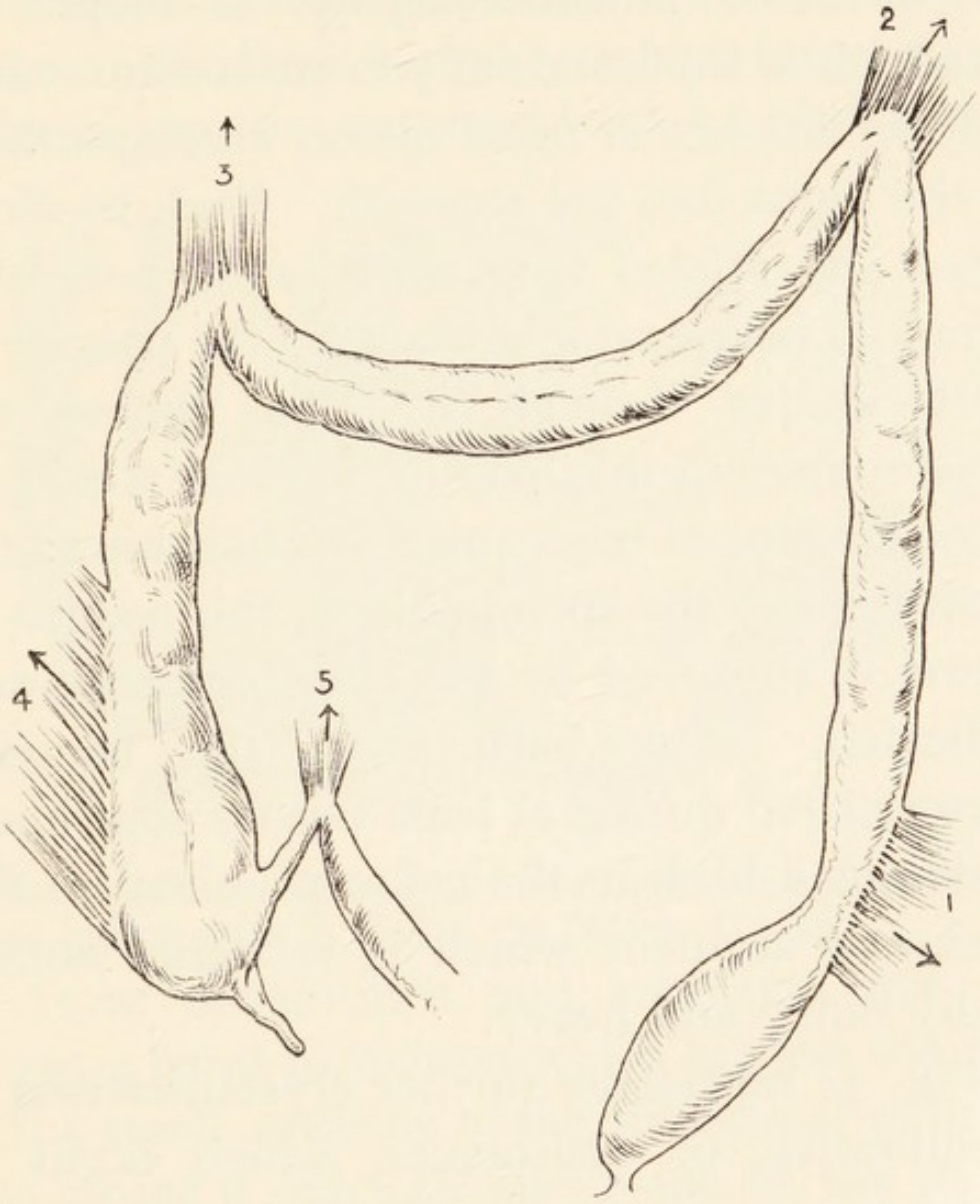


Fig. 34 shows the means the body adopts to abolish the tendency to the changes induced by over-loading of the bowel.

were possible to accommodate the products of twenty-four hours digestion or more in a section of the bowel which has been developed for hundreds of thousands of years to accommodate only an amount of fæcal matter corresponding to the input into the stomach. Such an elongated and dilated loop would sooner or later afford an insuperable obstacle to the passage of solid matter through it. To oppose the development of this loop or, in other words, to meet the altered mechanical relationship of the individual to the surroundings, this section of bowel is anchored by the band or membrane indicated. The balance of the contents accumulated during at least twenty-four hours is dammed back in the colon proximal to this anchored segment which is rendered abnormally bulky and heavy.

Fig. 34 represents further crystallizations of membranes, or resistances, which occur in consequence of the overloading and which develop to support the heavy bowel at the situations in which they can be most effective. (1) represents the primary band (the first and last kink), (2) secures the splenic flexure in the

left loin, (3) connects the gall-bladder with the hepatic flexure, (4), a broad and extensive membrane, holds up the cæcum or commencement of the large bowel in which large quantities of material dammed back by obstruction

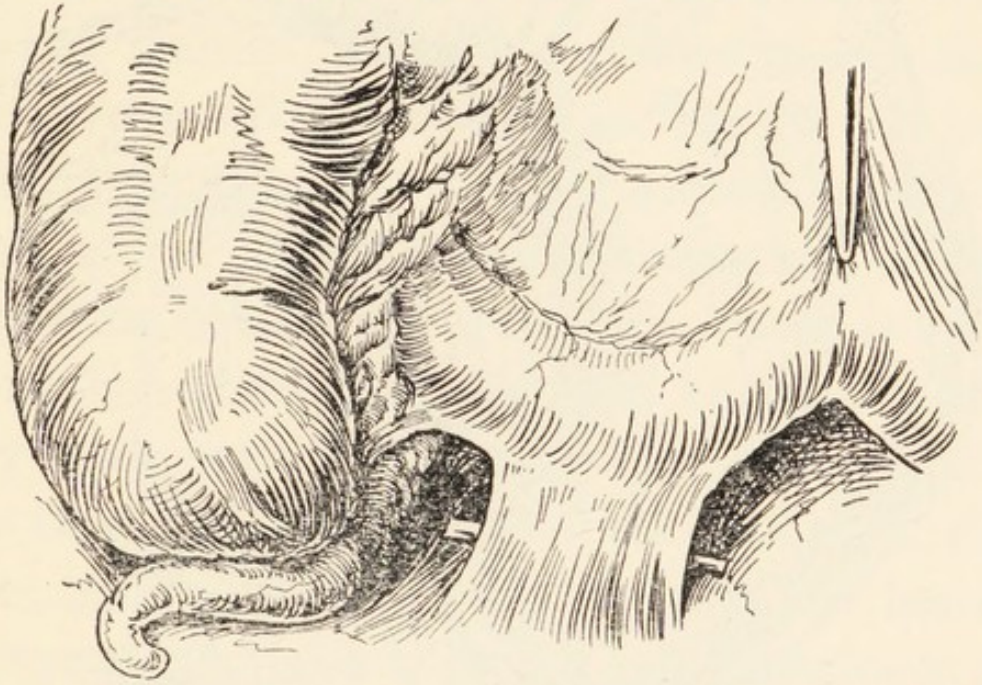


Fig. 35 shows the bowel raised and the extent of the band indicated at 5 in Fig. 34 (Mayo Clinic).

in front accumulate and stagnate, and (5) shows a band-formation which secures the end of the small intestine to the abdominal wall; by this means it helps to take some of the strain off the heavy cæcum, the commencement of the large bowel or cesspool, sharing this function with (4). This band kinks and angulates the bowel and obstructs the passage of material through it.

Fig. 35 (page 71) shows the bowel raised, and the extent of the band or membrane indicated diagrammatically at 5 in fig. 34, while

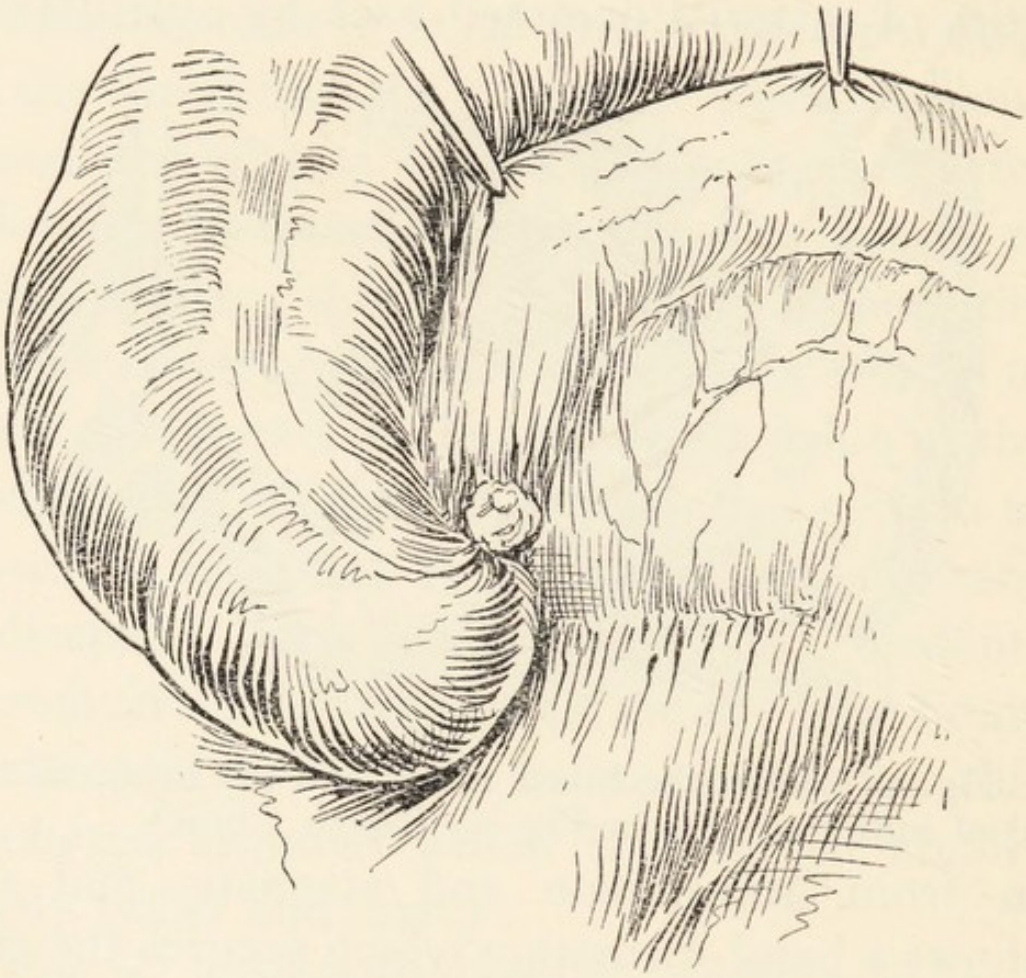


Fig. 36 shows division of the band with freeing of the loop of small intestine (Mayo Clinic).

in fig. 36 this membrane has been divided and the loop of small intestine freed from the control and the mechanical disability which its presence produced.

This development which, as already pointed out, illustrates the manner in which the soft parts of the body, like the skeleton, react when the mechanical relationship of the individual to surroundings is altered, takes place in a very marked manner when the mother insists that one evacuation is sufficient for health. It has been in process of evolution almost from the birth of the child, since constipation or the stagnation of material in the large bowel is such a common state in civilization, because of the very inadequate diet of the infant. The earlier this factor of stagnation comes into play, the more marked is the development of the bands or crystallized resistances, in just the same proportion as was noted in the case of fracture of a bone. Because of the early appearance of these bands in the life of the infant, some observers considered that they were congenital and that they existed before birth.

As time goes on, the obstruction in the end of the large bowel becomes a more marked feature, and the impact of stagnating and decomposing material on the wall of the narrowed segment sets up an infective or inflammatory

process, which is accompanied by a spasm of the muscle fibres that encircle it. In this manner the lumen of the anchored segment is still further reduced, while the infection of its lining membrane extends upwards along the length of the proximal bowel, constituting a condition spoke of as colitis.

Fig. 37 shows the spasm of the muscle coat and the consequent diminution of the lumen of the bowel commencing in the anchored area and extending upwards along the large bowel. The spasm is due to the inflammation of the bowel which results from the obstruction afforded to the passage of the bowel contents by the altered function of the anchored area. This inflammation or colitis, extending backwards along the length of the large bowel, results in the accumulation of the stagnant contents in the cæcum as shown in fig. 38.

When the tissues of the body have been still further degenerated by prolonged bowel poisoning or intestinal auto-intoxication, the inflamed mucous membrane in the area of the anchored bowel, like that in the upper part of the

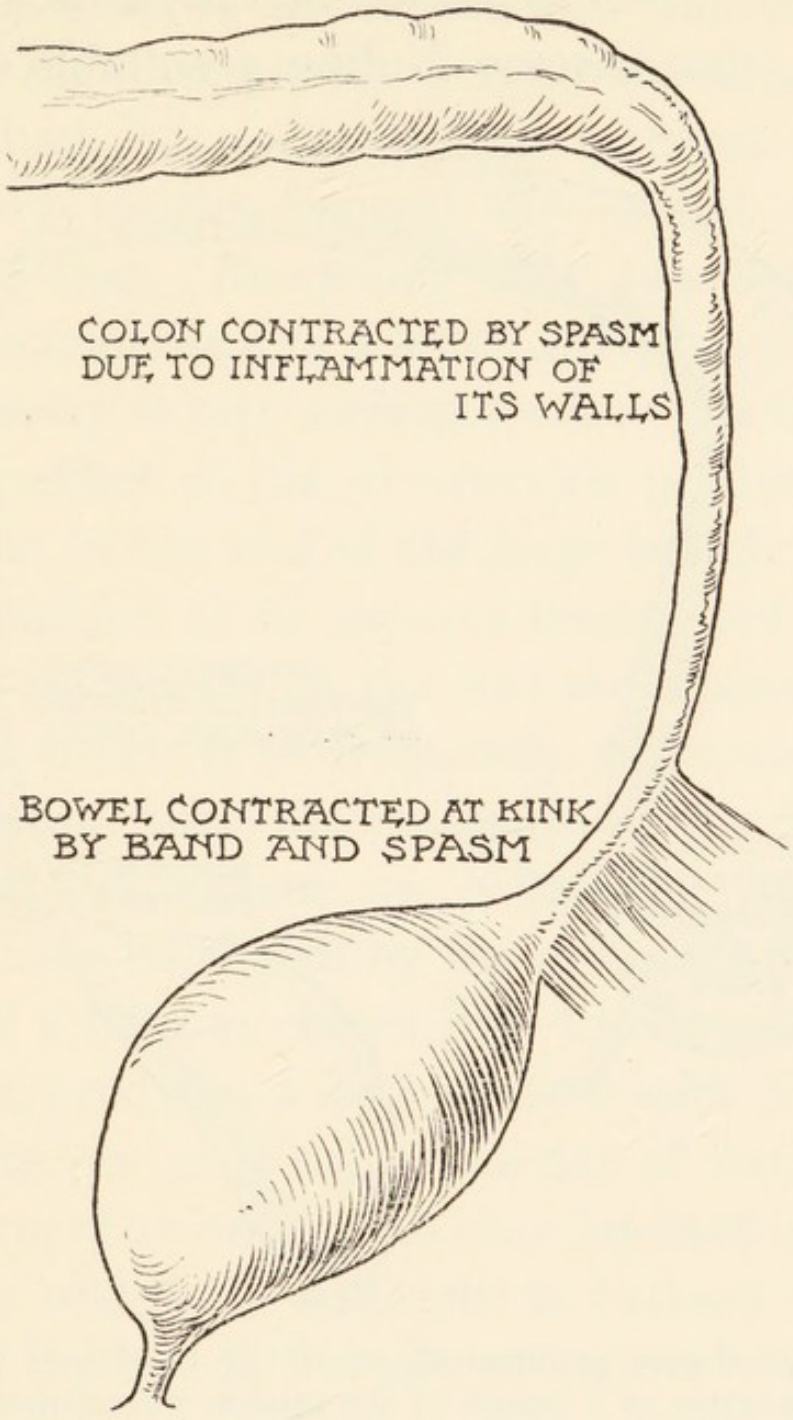


Fig. 37 shows the spasm of the muscle coat and consequent diminution of the lumen of the bowel commencing in the anchored area and extending upwards along the large bowel.

stomach, when ulcerated becomes infected by cancer, that disease finding a suitable soil in

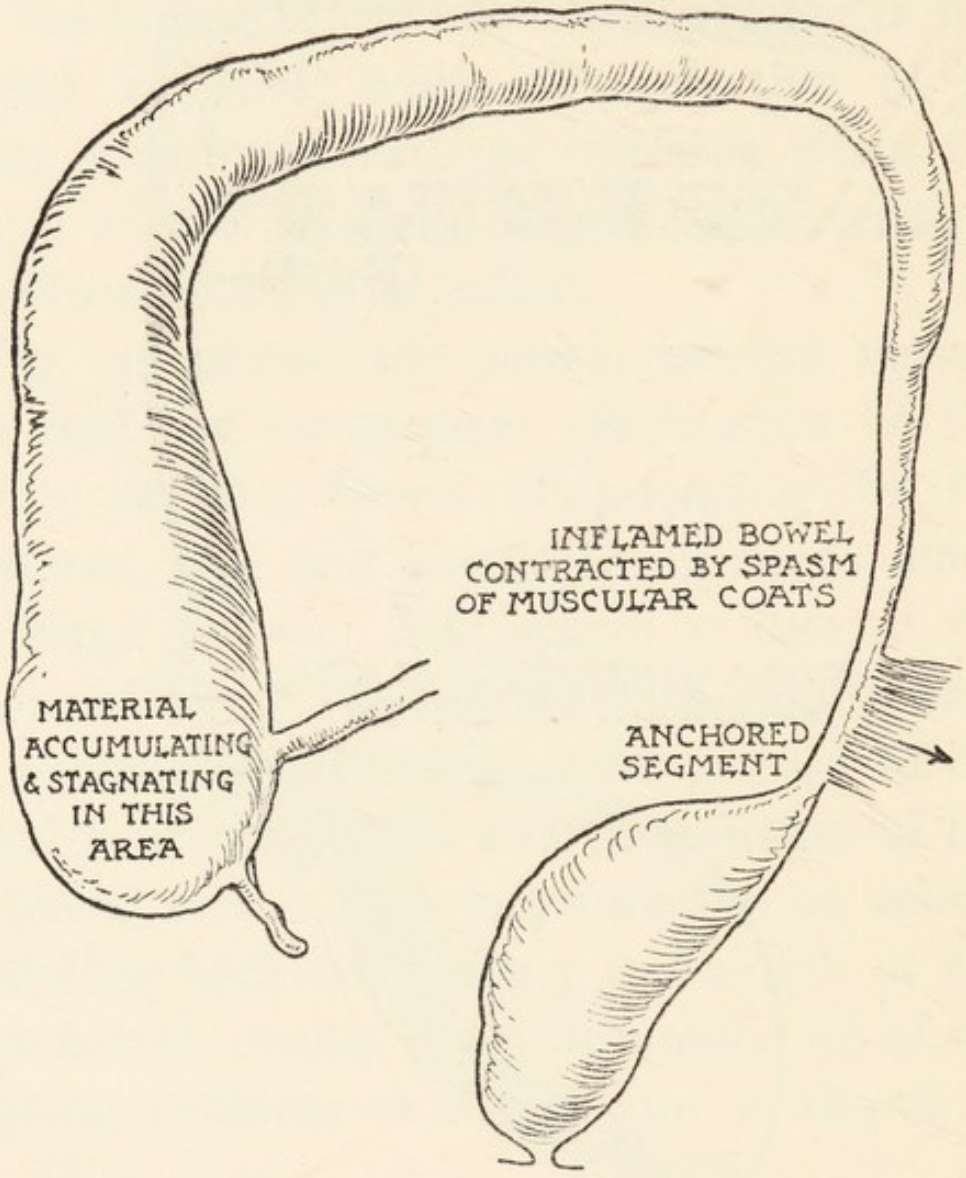


Fig. 38 shows accumulation of the intestinal contents in the caecum as a result of the spasm occasioned in the anchored area.

which it can develop.

This band formation, which in its initiation serves a useful purpose, later tends to bring

about a series of mechanical and toxic changes which not infrequently destroy the life of the individual. It is a striking instance of the corollary of the general law stated earlier, namely that: '*Everything that nature does to help the individual to meet an altered mechanical relationship to surroundings tends to shorten life.*'

The effect of the obstruction produced by the kink in the end of the large bowel, by the inflammation of its mucous lining, and of the cramp or spasm of the circular constricting muscle which is so frequently associated with it, together with the extension of the inflammation and spasm up along the proximal bowel, is well shown by the gradual introduction of a barium enema into the bowel. The barium produces a dark shadow with X rays.

In fig. 39 (page 79) a quantity of barium in the form of an enema has been injected into the rectum with force sufficient to balloon out the end of the bowel, but not enough to overcome the obstruction caused by the contraction and the spasm of the circular constricting muscle controlling the anchored loop.

In fig. 40 (page 80), on introducing a still

larger quantity of barium under an increased pressure, the spasm exerted by the encircling muscle in the fixed area is overcome.

In fig. 41 (page 81) the inflamed and contracted bowel above this area is overcome by the pressure so that the enema now distends it fully.

Fig. 42 (page 82) is an actual radiogram by Dr. A. C. Jordan showing the results of the introduction of an enema containing barium. As it is being administered, the lower portion of the bowel is over-distended and the obstruction which the anchored loop affords has been overcome, the opaque material trickling through it. It later distends the inflamed contracted bowel to the seat of obstruction. This is an ordinary typical example of the behaviour of an enema in a case of fixation of the bowel which results from constipation.

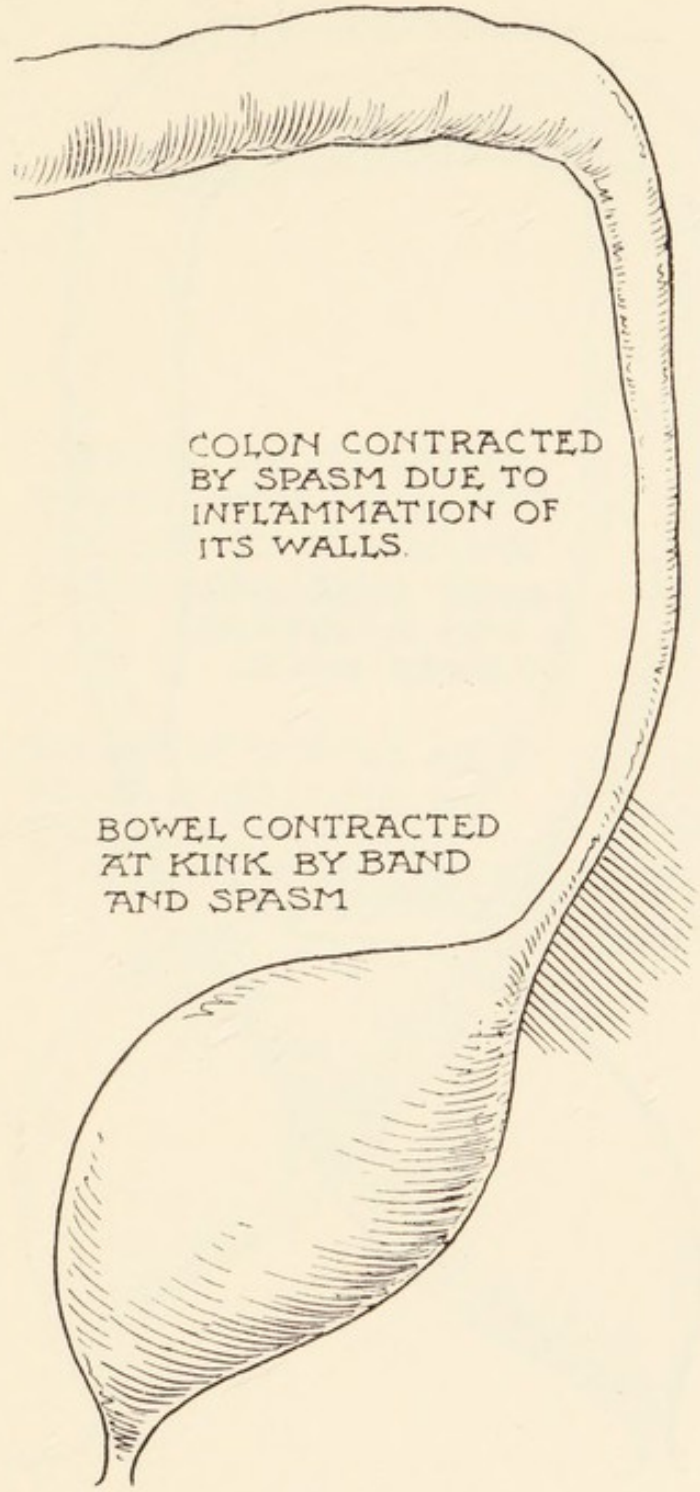


Fig. 39. First stage of barium enema.

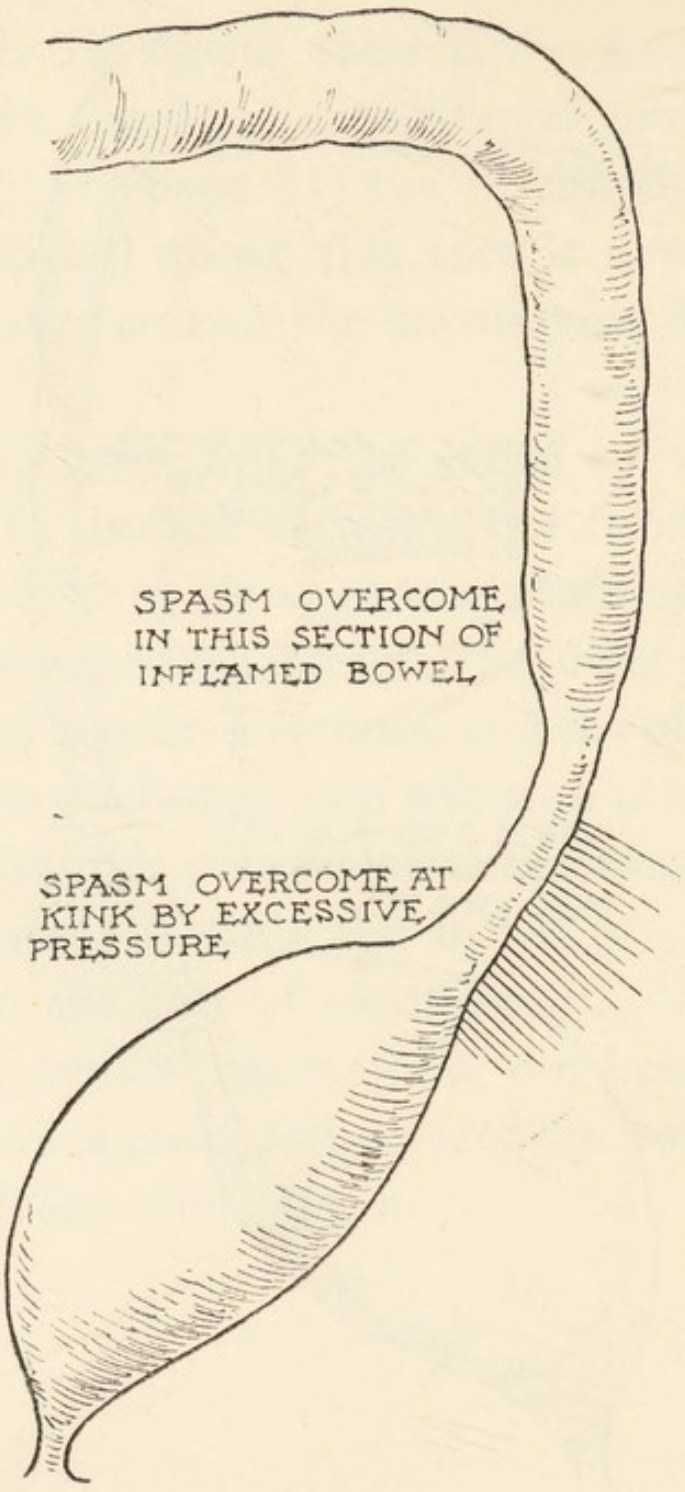


Fig. 40. Second stage of barium enema.

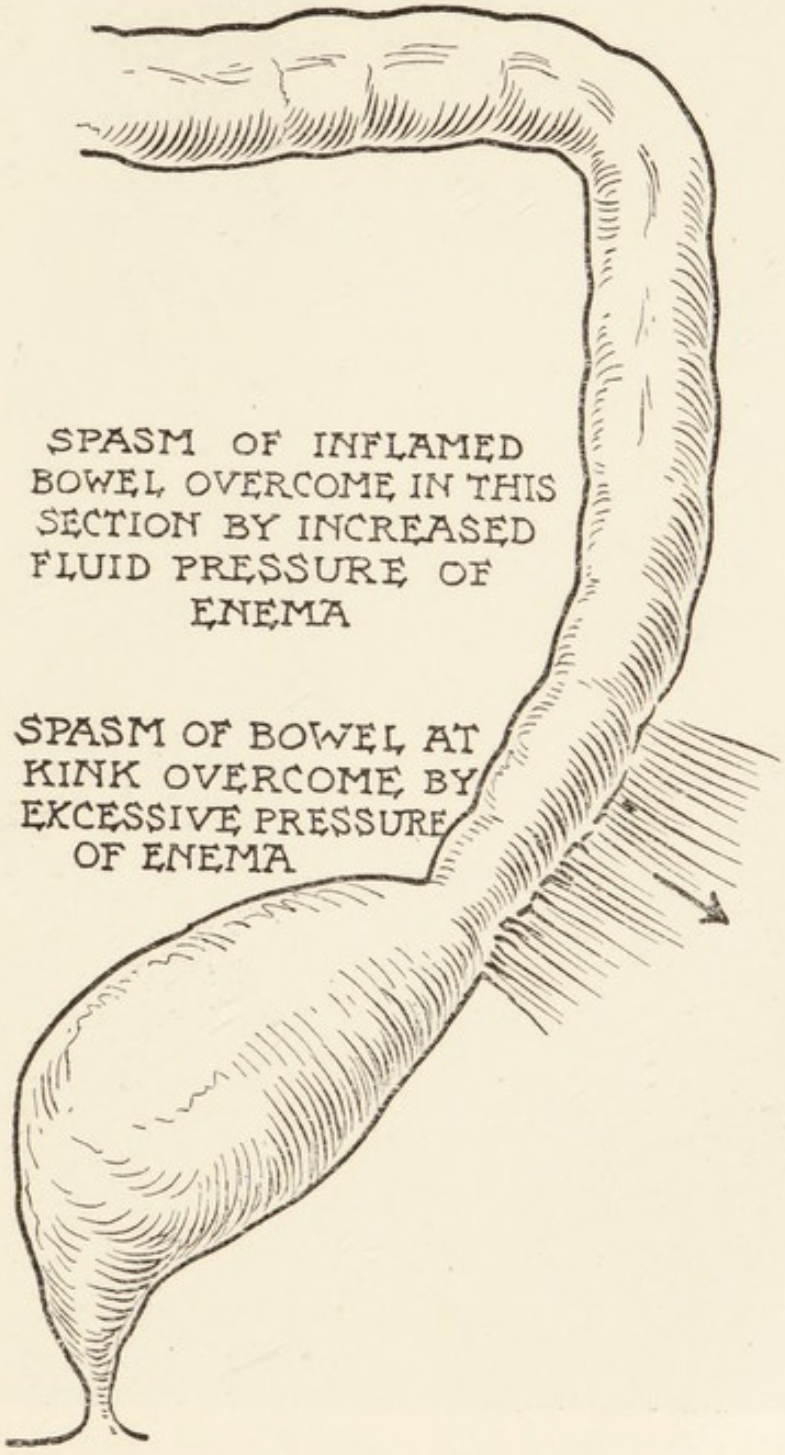


Fig. 41. Third stage of barium enema.

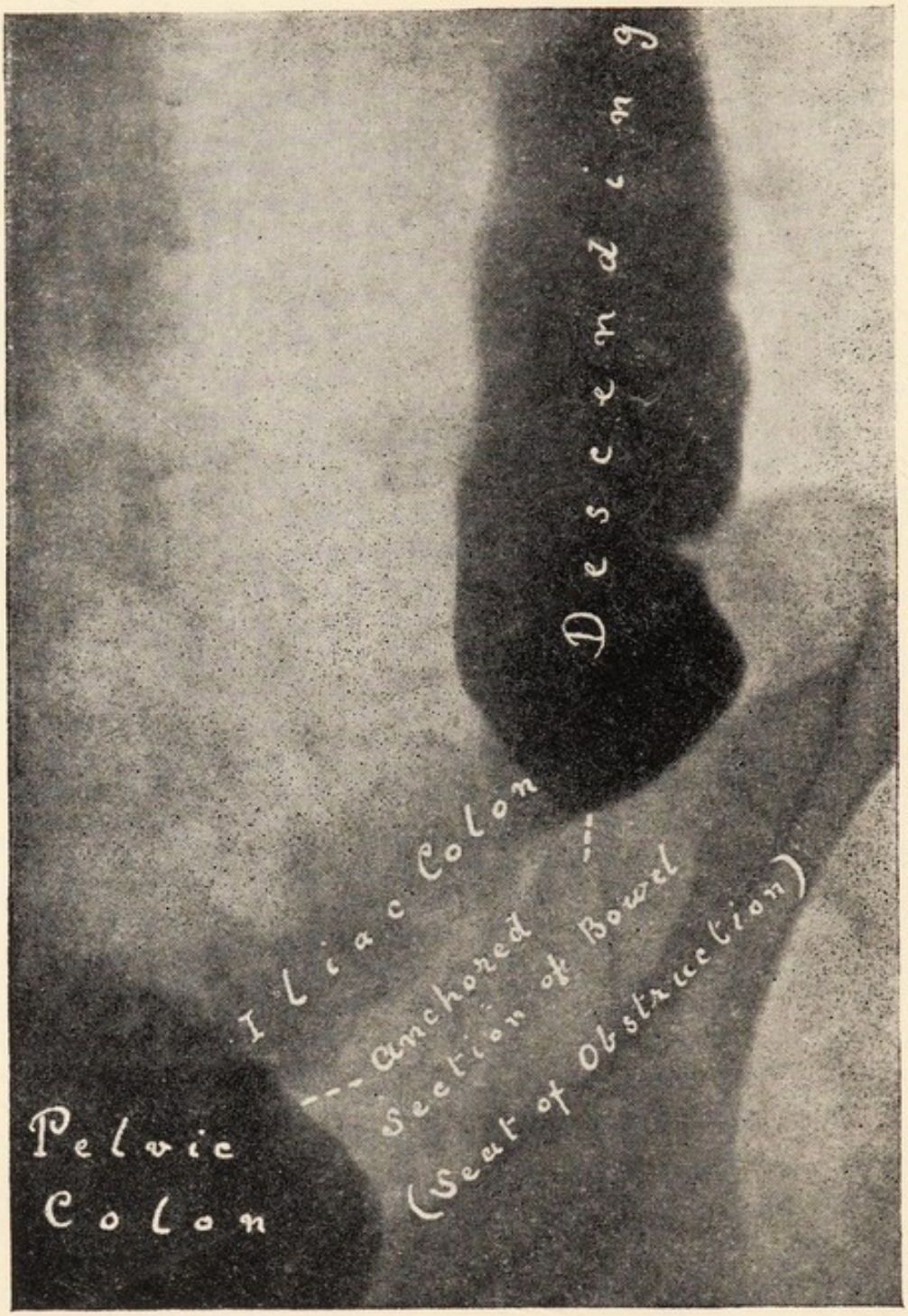


Fig. 42 is an actual radiogram showing the results of the introduction of a barium enema in a typical case of bowel fixation resulting from constipation (Dr. A. C. Jordan).

§8. CANCER AND CIVILIZATION

MANY readers have probably little or no idea what cancer is.

The skin, the mucous membranes, and the lining walls of the secreting substance of glands are composed of a fibrous basis in which the blood vessels run, and of a covering layer of epithelial cells. These layers are sharply defined and are perfectly distinct one from the other, as illustrated in fig. 43 (page 84), which is a section through the skin.

When the epithelial surface of the skin, or the cells lining the interior of the several glands, have been annoyed by some constant source of irritation for a sufficient length of time, they become inflamed, and later ulceration may take place. This ulcer, if it becomes chronic, tends to be infected by cancer, the cause of which is regarded by some observers as a micro-organism, but this is denied by others. In any

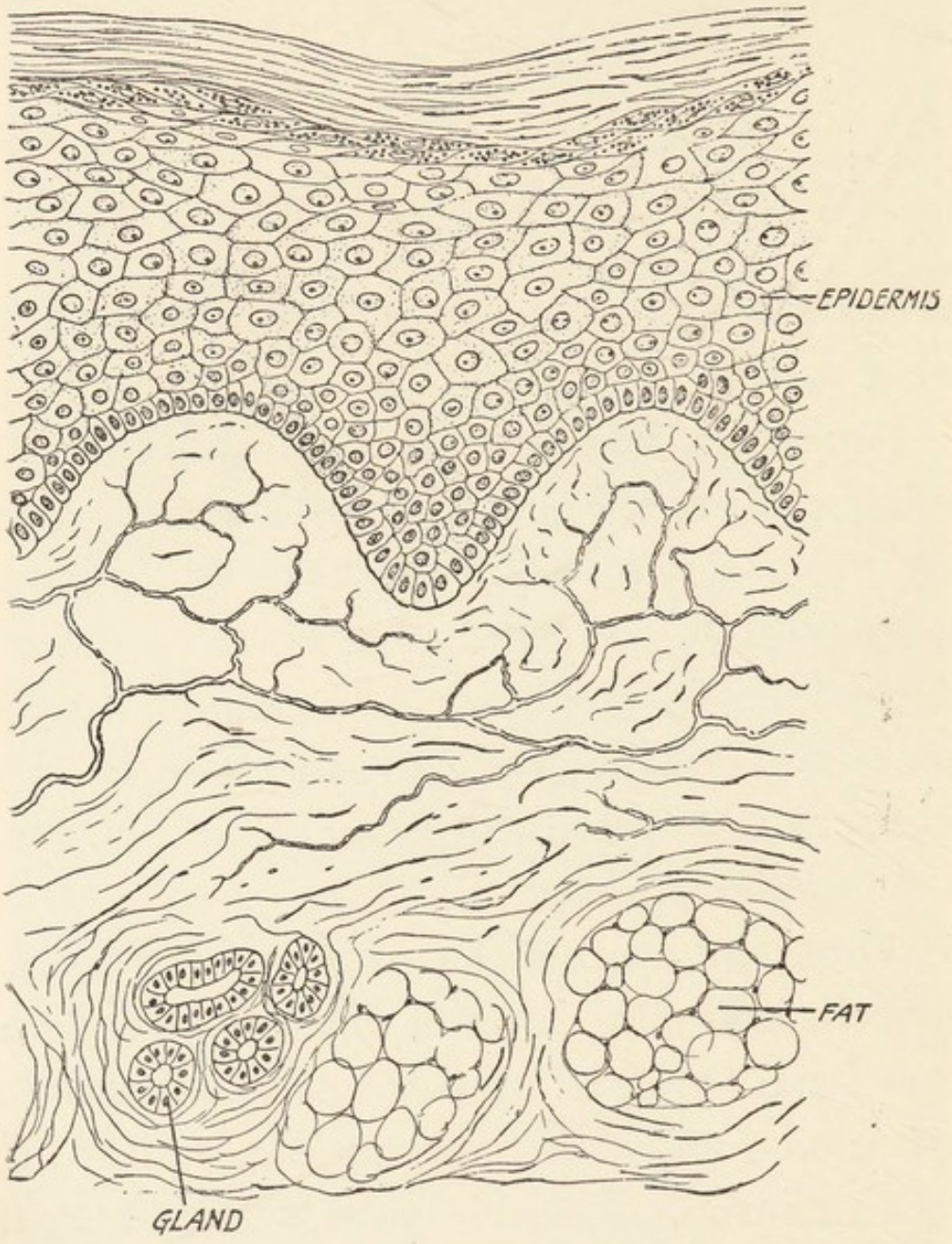


Fig. 43 represents a section through skin showing various layers of cells.

case there is no general consensus of opinion as to what organism, if any, produces cancer. As the result of irritation, whether by hot tobacco smoke, hot irritating drinks, radium emanations, X-rays, soot, crude paraffin or heat, a change takes place in the behaviour of the epithelial cells, and in their relationship to the subjacent structure forming the basis of the skin, mucous membrane, or gland tissue. The cells become altered in form and structure; they multiply, and the sharp demarcation between the cell layers and that beneath them becomes ill-defined. The altered cells invade the deeper structures in a more or less irregular manner, extending deeper and deeper into the subjacent tissues, as illustrated in fig. 44 (page 86). A more or less serious attempt is made by nature to control or limit this invasion by the formation of dense fibrous tissue in the structure into which the inroad of cells has thrust itself, and this strangulates the cells and causes many of them to degenerate, to die, to exfoliate, and to form an ulcer. These infected cells later extend into and invade the interior of the lymphatic channels or of the blood vessels, and are

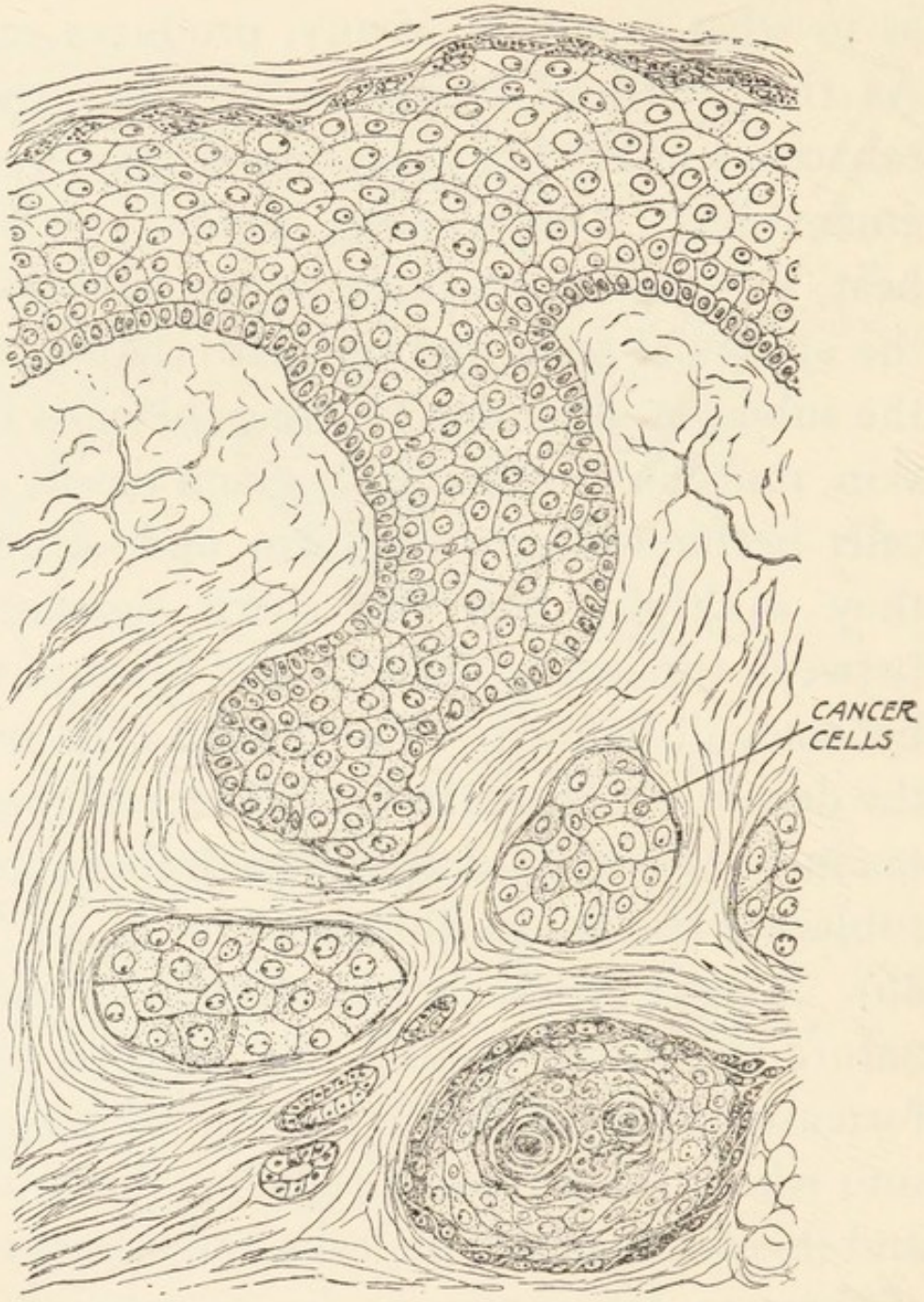


Fig. 44 shows section of skin with cancer cells invading the deeper structures.

carried by the lymph to the lymphatic glands, and by the circulation to the liver, lungs, and indeed to any tissue or organ in the body. Arriving in them, these migrating masses of altered cells behave as in the original growth, multiplying, invading, and damaging every tissue in their vicinity. Finally, when they have sufficiently destroyed one or more important organs, death takes place. Death may ensue earlier as, for instance, when a cancerous growth develops in a portion of the intestinal tract, when it may destroy life by so reducing the calibre of the bowel as to obstruct its lumen completely, and so kill the sufferer.

The surface of the skin is but rarely affected by cancer in comparison with other parts of the body. It is produced by one of the various forms of irritation already alluded to, as heat, radium, soot, crude paraffin, etc. Whether cancer of the skin, unlike cancer in any other tissue, can occur in perfectly healthy subjects is unknown. The only instances of cancer of the skin or mucous membrane occurring occasionally among robust native races is that consequent on the prolonged use of the charcoal

fire basket which is worn next the skin by the inhabitants of the Kangri valley. Cancer of the mucous membrane of the mouth is developed in consequence of prolonged chewing of an irritating betel-nut composition. Vigorous natives are exposed very much more than civilized people to the tropical rays of the sun, and to injury, while the habit of introducing foreign bodies, sometimes of considerable size, into the nose, ears, and lips would appear to afford a source of irritation sufficient to produce cancer in civilization, yet cancer never arises under native conditions in consequence of this habit.

To give the reader a rough idea of the incidence of cancer in white communities, the following statistics of the death rate per million males at ages above 35 show:

Breast	Jaw	Tongue	Lip	Mouth	Larynx	Rectum
5.4	29.5	150.1	39.2	47.5	70.8	295.5

The statistics for females above 35 show:

Breast	Jaw	Tongue	Lip	Mouth	Larynx	Rectum	Uterus, ovary, etc.
574.2	23.9	15.8	3.2	5.9	20.5	194.4	675.9

These figures give a sufficiently clear idea of the death-rate of cancer in the two sexes, and of the relative frequency with which the several portions of the body are affected by it in each.

These figures do not include cases of cancer which have been successfully operated on or which have died from some intercedent disease.

The following statement also illustrates the rate of increase of cancer in one of the Dominions.

'The crude mortality rate from cancer in Australia has increased from 26.1 per 100,000 mean population in 1870 to 89.1 in 1923.'

These figures are not produced to terrify the reader, but rather to impress on him the fact that if certain vigorous races, leading a simple normal life, are quite free from cancer, while the civilized races are becoming progressively infected by it at a terrifying rate, he must realize that it is his bounden duty to make himself familiar, as far as he can, with the conditions which are responsible for the existence of the disparity of incidence of this terrible scourge, and must endeavour by any means whatever in

his power to assimilate the conditions of the civilized community to those which exist in such communities as are quite free from it.

§9. TOWARDS 'NEW HEALTH'

I HAVE impeached constipation as the cause of all the ills of civilization, and I will now outline how stagnation of the contents of the bowels and the mechanical and toxic changes which result therefrom can be avoided.

The greatest of all physicians, Hippocrates, used to urge upon the citizens of Athens that it was essential that they should pass large bulky motions after every meal, and that to ensure this they had to eat abundantly of wholemeal bread, vegetables and fruits. To-day the medical profession in general regard one action of the bowel daily as being sufficient for health. On this I can only comment that the modern doctor is not following the precepts and practice of his great predecessor, and that knowledge of diet has not formed an integral part of his education. This is evidenced by the fact that even popular physicians have asserted that

white bread is just as good a food as wholemeal bread, and some have even protested that the bran and germ extracted from the wheat are injurious and irritating to the human intestine and are therefore only fit to fatten pigs and other animals who thrive on them. It is to be hoped that the recent foundation of a chair in dietetics at the London University, which owes its existence to the generosity of Mr. Harry Hague and an anonymous lady, will stimulate not only the medical profession but the entire public to make themselves familiar with the laws of diet. Such knowledge will serve to keep the people in health and will do a vast amount to prevent disease.

Many people assert that we eat too much. This is true in so far as we devour large quantities of food which contain neither sufficient vitamin nor roughage to ensure satisfactory drainage of the intestine, in other words, to prevent constipation. On the question of white bread, it is frequently maintained that this product is favoured by the working classes because it is cheaper than the wholemeal variety. This involves a fallacy, as shown by

Dr. Rowland's experiments on rats. When vainly endeavouring to obtain enough vitamin and roughage from white bread, the rat eats enormously, while, if provided with wholemeal bread, the animal requires but a small quantity to meet his requirements in these particulars. Therefore you will find that your children require only half the amount of wholemeal bread requisite for health and that they will have regular motions of the bowels.

The public have very little idea as to how much motion they must evacuate or of the great quantity that is evacuated after each meal by vigorous healthy natives living on their usual diet in normal conditions.

The male gorilla passes between 25 and 30 pounds of motion by his bed every night. It is easy to determine this, as he makes a large bed in a separate place every day, never occupying the same bed on two following days. To obtain the necessary amount of nutrient material from the food which he obtains from the wild, he must eat a vast amount, and this explains the quantity of undigested material which he evacuates.

Again, the authorities at the Zoo find it very difficult to prevent constipation in the higher apes for the reason that the cultivated vegetables and fruit do not contain the amount of indigestible substances or roughage on which the animal depended for the perfect functioning of his intestine when living under natural conditions.

If we in civilization hope to obtain a regular action of the bowels, as is required for health and strength and for the avoidance of all those diseases and conditions which I somewhat crudely but accurately describe as filth manifestations, it is necessary that we should drink plenty of water and eat large quantities of such foods as will provide us not only with enough nourishment but also with the wherewithal to secure efficient action of the muscle wall of the intestine.

If water containing a teaspoonful of common salt be injected into the tissue underlying the skin, it is absorbed very rapidly and it stimulates every cell in the body to perform its functions efficiently, causing the expulsion of the effete or harmful products of digestion. It

also stimulates the glands in the lining membrane of the intestine to produce in abundance the secretions which digest the food. Similarly, abundance of water drunk at a sufficient interval before or after meals produces the same effect, and the addition of a small quantity of common salt, or indeed any harmless salt, ensures its rapid absorption into the circulation and its action upon the cells of the body.

As regards diet, we must make a habit of eating more fruits, preferably uncooked, and, while all fruits serve a beneficial purpose, the grapefruit, the orange and the lemon in particular should enter largely into the diet. Wholemeal in various forms, milk, cheese, eggs and butter with jam are nutritious and health-giving foods, while salads with plenty of olive oil and especially containing such ingredients as are very green from the presence of chlorophyll which requires for its development the action of the sun, are most valuable.

Vegetables of all sorts are good, preferably steamed, unless the water in which they are boiled is used to make soup. Potatoes, which make such wonderful Irish police and beautiful

vigorous healthy Irish women, should form a large proportion of at least one meal.

If the bowels act regularly after each meal there is no reason why meat and fowl should not be eaten. It is well to remember however that the liver and kidneys are more valuable as articles of diet than the muscle and fat. Fish of all sorts can be eaten if perfectly fresh.

The necessity of executing one action after each meal cannot be emphasized too strongly, and, as in the vast majority of people the evacuation has been for years limited to one action a day, patience in resuming the normal habit, as insisted upon so long ago as 2300 years by Hippocrates, is essential. If you drink enough water, eat just the necessary food in sufficient quantity, and develop the abdominal muscles by suitable exercises, it is surprising how soon you will regain that regular normal habit of evacuation by which alone health, happiness and freedom from disease can be ensured.

In order to help the people to work out their own salvation the New Health Society was promoted. It was started with three objects :

1. To teach the people the simple laws of

health, since it was obvious that, only by acquiring such knowledge, will cancer and all the diseases which are so very general in a state of civilization be gradually eliminated. This is the problem before the nation, and it is indeed a very urgent one.

2. The second object of the Society is to render more accessible to the public such foods as fruits and vegetables which are essential to health, and which till recently have been regarded by many as luxuries rather than necessities. In this the Society has been greatly assisted by the active collaboration of the great fruit and potato industries, by means of which the supply of fruits, salads, and vegetables has been enormously increased. The streets of London and of other large towns are now adorned by shops, which are rapidly increasing in number and in which the produce of the soil is exhibited in an attractive manner. The result has been that the people are unable to resist the temptation to buy and eat it, with the obvious consequence that the health of the public has definitely improved, and is continuing to improve in a manner corresponding to

the increase in the supply of fruit and vegetables.

In addition to this, the sale of wholemeal bread, Swedish rye bread, Vita-Weat biscuits, Shredded Wheat, and other entire products of wheat is rapidly displacing the starchy products sold as white bread and cakes, which are deprived of the vitamins, salts, and roughage absolutely necessary for health and vigour.

3. The third object of the Society is of a much more ambitious nature. It is no less than to endeavour to put the people back upon the land, with a view to enabling them to lead more healthy, happy and active lives in the open air of the country, where they can be instructed by experts in intensive and other forms of gardening, the culture of fruit trees and shrubs, the care of domestic animals, etc., so that they may produce not only enough good fresh food for themselves but may provide for the people in the large towns much of the fruit and vegetables which they are now obliged to buy from the Continent, and which can perfectly well be grown on English soil in great abundance.

For the furthering of this work, which philanthropic effort can help materially, the Society hopes that some government may realize the vast importance of putting on the land a large number of the unemployed, who can be educated and usefully engaged in agriculture and in providing a considerable proportion of the food which is now grown abroad. By enabling them to get good food and to live in a healthy surroundings, a great deal can be effected to stem the threatening tide of social unrest and upheaval, which are the natural consequences of ill-health.

A FINE OF ONE CENT PER DAY WILL BE CHARGED ON OVERDUE BOOKS.

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