racially different from the Egyptians." Sir Arthur referred to the Lachish series as "the first complete account of the racial characters of a people living in Palestine during biblical times".

In the same depository of skulls, three examples were found to be trephined. This operation was common so early as neolithic times in Europe, North Africa and even the two Americas. It is also practised by primitive people to-day. The specimens from Duweir are unique, being the only ones so far discovered in the Near East, and their presence shows once again the many influences which affected the coastal strip. It is not possible to say whether the operation was therapeutic or magical. Two methods occur at Duweir: one was removal of the disk by cross cuts, as seen in two skulls where the sharp edges indicated that the patient died shortly afterwards, and there is a triangular type more akin to the European method of scraping, which gave the patient a better chance of recovery.

The Babylonian campaigns which mark the virtual end of the city are well attested both in their own and Biblical records. The period between 700 and 600 B.C. is represented on the mound by a district of shops and houses protected by a city wall which had been repaired since Sennacherib's attack. The Babylonian commander was aware of the perils of leaving partially destroyed fortifications, and he burned long sections of the wall by heaping great piles of olive trees and brushwood against them. In the charred debris, we still find the calcined olive stones which show that destruction took place in the autumn just before harvest time.

At the gate of the city, in the guard-room of this last period of fortification, while sorting a mass of blackened sherds, Mr. Starkey with Mr. Harding found the now famous "Lachish Letters". They form an invaluable link with the Bible record; for the first time we can study the handwriting of contemporaries of the prophet Jeremiah, written in the beautiful pre-exilic script, which is allied to our own alphabet through the Phoenicians. Dr. H. Torczyner, who undertook the publication of the letters, has noted many Biblical names and directs attention to phrases which have all the flavour of Old Testament language. Letter IV includes the sentence, "if in his turning (on his rounds) he had inspected, he would know, that for the signal stations of Lachish we are watching, according to all the signs which my Lord gives, because we do not see (the signals of) Azekah". These words imply that Lachish and Azekah were still linked in the same system of defence as in King Rehoboam's reign.

The defences of Duweir were finally broken about 600 B.C., but the town enjoyed a short period of revival during the Persian occupation. The Persian residency crowned the site for a few years, and was built on the massive foundations of the earlier Judæan fort.

In presenting the shadowy traces of the many peoples who passed by, it is hoped that in years to come some one will carry forward the work which James Leslie Starkey began.

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MUSCULAR AND MENTAL RELAXATION IN PEACE AND WAR*

By DR. E. J. BOOME

RELAXATION means more than just a holiday or a lazy time; it means concentration and not inertia.

The relaxation of muscular exercises, in moderation, re-creates the body and conduces to physical fitness, which is one of the chief bases of mental poise and well-being. But relaxation is much more far-reaching in its effects and more constructive in its processes. Beginning with a muscular loosening, it leads to a gradual re-creating of the individual. This form of self-treatment, apparently very simple, is more complex than is realized by the beginner.

Everyone feels the state of tension in the world to-day and the need for some antidote to counteract it. This tension—always in the world even in time of peace—is greatly aggravated by war conditions. In individuals it is expressed by muscular hypertonicity, in mental worry, fear, anxiety, in emotional repression and nervous strain. These factors sometimes react upon each other and cause a breakdown.

Nervous cases tend to become more frequent in days of fear and anxiety such as we have all been through during the past four years. Some people come back automatically to normal, but others do not. Often the attitude of friends and relations intensifies the feelings of these people. Even medical men sometimes say: "There is nothing wrong with you, it's only your nerves or your imagination". Nowadays, we are more careful because we realize that such an attitude only makes these patients ponder more over their ailments, imaginary or otherwise. This makes matters worse, as they become almost convinced that there is really something wrong with them and turn to patent medicines which claim to cure all their ills.

Annie Payson Call, in her book "Power Through Repose", very wisely said:

"Where is the good of taking medicines to give us new strength, while at the same time we are steadily disobeying the laws from the observance of which alone the strength can come? No medicine can work a man's body, while the man's habits are constantly counteracting it. Where is the use of all the quietening medicines if we only quiet our nerves in order that we may continue to misuse them without their crying out? They will cry out sooner or later."

In order to prevent this, we must first investigate the causes of hypertension.

The body reacts on the mind and vice versa. This happens in cases of real illness, particularly if the patient has never been ill before. He gets anxious about his condition and even becomes angry with himself for being ill. This sets up and increases mental and muscular tension and retards recovery. A cheerful patient, on the contrary, generally recovers more quickly.

Work never killed anybody, but the worry which is added to and mistaken for work has caused many a breakdown. In war-time there is often the element of fear added, which increases the wear and tear of one's daily occupations. Many people waste 50 per

* Substance of a Chadwick Trust Lecture delivered on October 5 at the Royal Institute of Public Health and Hygiene.

cent of their efficiency and adversely affect the environment of those working under them because of their own anxious temperaments. Often they cannot see the harm they are doing to themselves and others and scornfully refuse any suggestion of treatment.

In Great Britain 20,000,000 are employed, many on war work. 40,000,000 weeks a year are lost from sickness, of which it is estimated that we lose 8,000,000 weeks of work a year through gastric and nervous disorders. Many so-called gastric disorders are not due to disease of the gastro-intestinal tract but to functional dyspepsia—an emotional disturbance which shows itself by gastric disturbances. A similar proportion of imagined 'nervous dyspepsia' found among civil defence workers (ambulance, fire brigade and rescue services) clear up with a change of scene and rest.

War-time restrictions which control the lives of 8,000,000 civilians give a sense of frustration, and may cause nervous illness and anxiety in some people. This discontent and frustration caused by war-time conditions may be alleviated by the Ministry of Labour schemes for 'rest-break' homes for war workers. These are to be greatly extended, and soon a network of these hostels will be established throughout Great Britain. Pamphlets such as "Fighting Fit in the Factory", explaining the necessity for rest whenever possible and telling workers the best way to relax, can help.

Much is being done by the Ministry of Labour and National Service to make the life of the workers as harmonious as possible.

Some so-called 'authorities' say that complete relaxation is impracticable in everyday life. It is not only practicable but also desirable. The complete process is obviously not possible in all circumstances and places, but we need not use so much unnecessary muscular energy in the ordinary ways of life, such as clenching the jaw when writing or pushing against the floor with the feet when riding in a bus. Legs should sometimes go 'off duty'.

Relaxation in Crafts and Sports

Most crafts and sports depend upon rhythm to attain the best results. Rhythm again depends on correct timing, which can only be carried out by muscular balance. This is brought about by alternate muscular contraction and relaxation. The excitement of some forms of sport may cause hypertension, and the more this increases the less efficiently are the necessary movements carried out.

In yachting the helmsman must have complete muscular control to steer a steady course, as well as being mentally wide awake to take decisions and give orders to his crew.

Rhythmic timing is shown in such diverse sports as boxing and fishing, while success at golf and many other sports depends on accurate timing.

Eric Linklater in the "White Man's Saga" gives a beautiful description of the boxer. He says:

"There is beauty in boxing when men stand upright and step lightly. There is design in their movements, and significance as charged as that of the ballet. Counterpoise follows on poise, defence on attack, reaction on action with a balance, a trim symmetry that quickens as the blood beats and grows and swells into a pounding orchestration of thudding fists and shifting, sliding feet; for an instant there is repose, the sculptured austerity of two figures, motionless, poised like statues on the

verge of life; and then their static energy is again released to mingle dynamically in a crescendo of action".

Tobias Matthay in "The Visible and Invisible in Piano Technique" emphasizes the important changes of state of exertion and relaxation of the playing limb which form the real basis of good technique, but which, being invisible, have escaped attention.

Physiological Facts with Regard to this Thesis

Resting muscle is alkaline, whereas over-worked or fatigued muscle contains lactic acid. The amount of the latter is in proportion to the amount of tension.

Pain and violent emotion of any kind such as anger or fear cause chemical changes by releasing toxic substances and excessive glandular products into the system, which have to be carried away and thrown out by the blood stream into the channels of excretion. Excessive adrenalin in the blood may lead to vascular troubles and other harmful conditions unless dissipated either by action or muscular relaxation.

Long-distance runners are massaged so that the muscle gets rid of its waste products more quickly. Return flow of blood to the part is increased after contraction and relaxation, so circulation is increased.

Medical Examination

Muscular relaxation is of the greatest assistance in medical examination. If a candidate for superannuation and pension or life insurance presents himself before the medical examiner strung up to a state of tension, he will show signs of quickened heart-beat and his chest will tighten up with inhibition of breathing. He may stand stiffly to attention, thinking he is thus making the best of himself, which causes his blood pressure to go up under the strain he makes himself undergo. If the medical man can persuade him to relax the task is much simpler, time is saved and the candidate feels happier. A 'bedside manner' really is a useful, if not an essential, asset to a medical man. It means he is himself relaxed, has poise and can thus command confidence.

Often the practice of relaxation can cure stammering and relieve high blood pressure.

Stammering

This distressing condition was one of the reasons I became interested in relaxation. In 1919, I was placed in charge of centres for stammerers. In those days we used only voice training and speech drill, treating the symptom and not the cause, and the results were depressing.

Psychological and temperamental readjustments are of great importance in the treatment because the stammerer's outlook on life in general and himself in particular is depressed and usually negative.

Relaxation calms and reassures the sufferer and enables him to carry out his day's work quietly and efficiently. All his characteristic symptoms of tension disappear and he becomes a strengthened, stable and self-respecting person, ready to face the world with confidence.

Asthma is a nervous complaint rather like stammering. Good results are obtained by relaxation therapy in these cases, and diminution in frequency and severity of attacks follows treatment. The nervous tension and anxiety so frequently found in these cases are much diminished. The breathing becomes easier, confidence is restored and the distress is abated.

With regard to birth palsy, I have seen excellent results with muscular relaxation for the paralysed limbs. Relaxation seems to give increased confidence, with consequent improvement in gait, and also to make the best use of the injured muscle.

In cases of tennis leg and tennis elbow, relaxation is an important part of the treatment.

According to the late W. Trethowan, 85 per cent of cases of spinal curvature are due to functional nervous disorder and are not indicative of any organic disease. This condition usually denotes that a larger call is being made on the child than its general physique will stand. It is often found during adolescence and may be associated with enlarged tonsils, adenoids, constipation or over-pressure in study.

Attention to the general health usually results in the disappearance of the defect. Early cases of spinal curvature respond better to a midday rest in the recumbent position than to exercises. It is useless to try to heal the muscles by working them. Muscular relaxation practised under expert guidance is of untold value; it not only rests the patient but also is definitely curative in effect.

An elementary school teacher of great experience told me that children suffered less when the Blitz was at its height, because they were in the shelters early and went to sleep. During later raids they no longer went to the shelters regularly but played in the streets and went to bed late. When the sirens sounded they were got out of bed, with resulting greater fatigue and emotional disturbance. In one day raid in 1943 there were bombs and machine-gunning in the streets which caused an increased amount of tension at the time and delayed progress in relaxation therapy at some of our speech centres. On the morning after the winter raids of 1943 it was interesting to notice that the children relaxed voluntarily for a much longer time than usual.

The evacuation of school-children has shown that far more children suffer from enuresis than was generally supposed. Some cases are the result of neglect in training, but the majority are attributable to nervous causes. Some children develop this habit on being evacuated to the country, but in many cases it stops if the child settles down happily. If the enuresis is of long standing and the child is unhappy, it may be necessary for the case to be sent to a special hostel, though it is doubtful whether this segregation is satisfactory in all cases. A nervous, sensitive child may develop a sense of shame difficult to eradicate even after the enuresis has been cured.

Stammerers suffering from enuresis have been cured of this habit through relaxation, and cases have been known where the enuresis has ceased after one week's attendance at a centre.

In the case of writer's cramp, there is, in addition to the physical condition, a psychological factor. These cases are helped greatly by relaxation.

Dr. Grantly Dick Read says that pain in child-birth could be largely eliminated if mothers were trained to relax from the fourth to fifth month of pregnancy for a few minutes each day. So much pain in normal child-birth is due to a misapplication of the sense messages of fear to the brain, which leads to a tension of the fibres.

Conclusion

Relaxation in some form has been known throughout the ages. Even animals and plants relax for specific periods.

Primitive races still instinctively use it, and ancient

racers of the East have never ceased to practise it, perhaps because their civilization is of longer duration than ours and was arrived at more slowly.

There is nothing new in the art of relaxation, and its complete story has yet to be told. It is not the panacea for all ills, but it can alleviate physical, nervous and emotional conditions.

The inner peace and tranquillity that may be developed by means of relaxation may pervade a man's life; so that we can still say with the Psalmist: "Commune with your own heart upon your bed, and be still".

SYNTHESIS OF NEW SPECIES OF WHEATS*

By DR. ANTON ZHEBRACK

Timiryasev Agricultural Academy, U.S.S.R.

AS generally known, the species of wheats existing in natural conditions are classified into three chromosome groups of 14, 28, and 42, according to the number of chromosomes in their somatic cells. The most widespread species represented by a great number of varieties of races, biotypes and agricultural sorts is the bread wheat *Triticum vulgare*. This species is the most polymorphic and is represented by spring as well as winter sorts of wheats. The record frost-resisting agricultural sorts are found only among *Triticum vulgare*, which belongs to the group with the highest number of chromosomes.

The fact that a number of very valuable agricultural and biotypical qualities has developed in the process of evolution among the highest chromosome species of wheats *T. vulgare*, supports the chromosome theory that the high chromosome species are undergoing evolution and adapting themselves to various conditions of environment more rapidly than the species with a low number of chromosomes. Hence the problem of introducing wheats into new areas might best be solved by increasing the number of chromosomes. The above, as well as a number of purely theoretical considerations, led us to take up the question of obtaining high chromosome forms of such an important cereal as wheat. However, as most species of wheats are already polyploids, no more valuable and more fertile types can be obtained by an increase in the number of chromosomes in pure wheats, as this would probably lead to highly sterile forms.

We therefore began our effort to obtain high chromosome forms of wheats by doubling the number of chromosomes of interspecific hybrids and not that of pure species.

We selected two species of wheats for hybridization, namely, *Tr. monococcum* and *Tr. Timopheevi*. Both these species are immune from a number of fungal parasites and insects and, what is most important, they have isolated chromosome complexes producing, when crossed with other species, absolutely or highly sterile hybrids. By increasing the number of chromosomes of such highly sterile hybrids we restore fertility and obtain amphidiploid types with higher numbers of chromosomes than those of the parental species of wheats.

* A report on this work was made by Dr. Anton R. Zhebrak in 1940 at the December session of the Timiryasev Agricultural Academy, in 1942 at the November session of the Academy of Science of the U.S.S.R. in Tashkent, and was repeated at the session of the Timiryasev Academy in March 1943.