

Physical training for high speed competitions / by Percy Furnivall.

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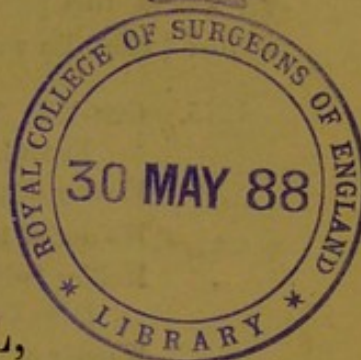


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PHYSICAL TRAINING 8

FOR

HIGH SPEED COMPETITIONS.



BY

PERCY FURNIVALL,

STUDENT OF ST. BARTHOLOMEW'S HOSPITAL, ONCE A BICYCLE AND TRICYCLE
AMATEUR CHAMPION.

PAPER READ BEFORE THE SOCIETY OF CYCLISTS, LONDON, AT ITS
MEETING ON TUESDAY, MAY 24, 1887, AND NOW REPRINTED
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1888.

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IN order to show that Mr. P. Furnivall has some right to speak on the subject of this paper from practical experience, a list of his chief wins in 1885-7 (when he was 18-20) is given below. He was, in

1885. One-Mile Tricycle Champion, and Holder of the One-Mile Tricycle Record.
- „ Holder of the Two, Three, Four, and Five-Mile Tricycle Records.
- „ Holder of the One-Mile ~~and Five-Mile~~ Bicycle Records.
- „ Holder (with G. Gatchouse) of the One, Two, Three, Four, and Five-Mile Tandem Records.
- „ Winner of 11 Prizes in his 11 Races (7 firsts, 3 seconds, 1 third) with the English Team in America.
1886. One-Mile and Five-Mile Bicycle Champion.
- „ One-Mile Tricycle Champion.
- „ Champion of the Racing Cyclists' Club.
- „ Winner of the International Challenge Shield and City Challenge Cup, Surrey Challenge Cup and Trophy, Kildare Challenge Cup, &c.; Bicycle.
- „ Winner of 18 Firsts, and 3 Seconds (through illness), in his 21 Races.
- „ Rider of 1 Mile in 2 min. 30 sec., in Aug. at Long Eaton.
- „ Holder of the Bicycle Records for a quarter, half, three-quarters, and whole mile.
1887. Holder of the Bicycle Records for a quarter-mile, and from 11 to 17 miles, and 19 to 25 miles.
- „ Winner of the Surrey Challenge Cup outright: 10 miles, Bicycle.
- 1884,-5,-6,-7. Champion of the Berretta Club.

(Some of the above Records were World's Records.)

PHYSICAL TRAINING

FOR

HIGH SPEED COMPETITIONS.

BEFORE beginning the formal part of my paper, I wish to state that my appearance here to-night as its reader, is not (as you may well believe) due to my own wish, but to that of our chairman, Dr. W. B. Richardson, the founder of the society, who has asked me to occupy this evening. I felt that I could not refuse, but must do my best to comply with his request, bad as that best may be. It is my first attempt at anything of the kind. As you know, I am more accustomed to the wheel than the pen, and I therefore throw myself on the indulgence of my hearers, who will recognise that I have made free use of the authorities on the subject to be discussed, Huxley and Kirk, on the one hand, for physiology ; Maclaren and Cortis, on the other, for athletics.

Any one taking part in any sport requiring a great amount of muscular exertion must, to some degree, prepare his body and muscles to meet the strain put upon them. The special form of muscular exertion I propose to treat to-night is cycling ; not on the road for pleasure, but either on track or road for hard racing. Now, as a sculler or a runner asks himself what special muscles or parts of the body are called into exercise by his sport, so the cyclist has to inquire what limbs, organs, and muscles he will have specially to exert in the course of his race. The answer is, that the driving power comes chiefly from the loins and legs, the muscular movements involved in which necessitate the rapid action of the heart and lungs, so that they also have to be looked to. And finally, without pluck and judgment no great success is possible. The style of man to be chosen for bicycling should be one above medium height, with wide hips, long legs, and powerful thighs, with a chest big enough to give full play to his heart and lungs. Contrasting generally the bicyclist with the tricyclist, the latter would be the shorter, thicker-set man of the two.

The great muscular exertion required for cycling produces a large waste of the tissues of the body. The first question, therefore, is, what this loss consists of, and by what materials it can best be repaired.

Here it may be interesting to give a few of Huxley's statistics. The average weight of a full-grown man is 11 stone, or 154 lbs. This 154 lbs. is thus distributed : muscles, tendons, and muscular appendage 68 lbs. ; skin $10\frac{1}{2}$ lbs. ; fat 28 lbs. ; hair 3 lbs. ; lungs and heart $3\frac{1}{2}$ lbs. ; abdominal viscera 11 lbs. ; blood in vessels 7 lbs. ; skeleton 24 lbs. The heart of such a man beats 75 times a minute, and he breathes 15 times a minute. In 24 hours he vitates 1750 cubic feet of pure air to the extent of 1 per cent. A man, therefore, of the weight mentioned should have 800 cubic feet of well-ventilated space. He should throw off by the skin 18 ounces of water, 300 grains of solid matter, and 400 grains of carbonic acid every 24 hours. His total loss would be 6 lbs. of water, and 2 lbs. of other matter.

In order that this loss may be made good and life maintained, it is

necessary that the body should be supplied with food of proper quality and quantity. The food is used for replacing the waste of the tissues; and as no one substance contains all the elements composing these solids in proper proportion, it is evident that the diet to make up for these losses must consist of several substances, not of one alone. For the sake of convenience these substances may be classified as follows:—

Organic nitrogenous : as flesh of animals, fish, milk, eggs, and leguminous fruits.

Carbo-hydrates : bread, vegetables, non-leguminous fruits.

Substances supplying principally fatty bodies : butter, lard, suet.

Salts are found in all foods.

Of the solid foods above named, the nitrogenous ones make chiefly the muscles, and the nitrogenous part of the nervous system; the carbo-hydrates form heat, and the necessary fat as a store for emergencies. Most of these substances are, of course, to be eaten cooked. "The general effect of cooking is to make food more easily digestible; and this includes two other alterations: food is made more agreeable to the palate, and also more pleasing to the eye. Cooking consists in exposing the food to various degrees of heat. The effect of heat upon flesh is to coagulate the albumen and colouring matter, solidify fibrin, and to gelatinise tendons and fibrous connective tissue." The effect of boiling an egg is, that the albumen is coagulated and turned into a more suitable article of food. Vegetables are by cooking made softer, so that they can be more readily broken up in the mouth; and cooking also causes the starch to swell up and burst, and so aids the digestive fluids in penetrating into the substance.

Having thus explained the constituents of food, and the operation of heat on them, I pass to the kind of food and meals the cyclist should take, and will then say a few words as to the general principles of men managing themselves in relation to their diet.

The principle guiding the selection of meals should be to take plain, substantial, nourishing solids, with simple unexciting fluids.

Assuming that a man has got up at 7.30, had his cold bath, a good rub-down, ten minutes with the dumb-bells or Indian clubs, and a short walk, I would allow him for breakfast, at 8.30, bread or toast, and a little butter; porridge and milk; chop, steak, or eggs. For drink, tea, coffee, cocoa, or milk.

Dinner at 2 p.m. Mutton or beef; poultry and fish occasionally; and a moderate quantity of green vegetables, potatoes, lentils, and haricot beans; a plain milk pudding, with a little stewed fruit, and bread. Water only to be drunk.

Tea at 7 p.m., consisting of hot or cold meat, with tomatoes; and bread-and-butter. For drink, tea, coffee, or cocoa.

You will observe that I do not tax the energies of the digestive organs with substances giving no adequate return for the labour; and (as I said before) you get your nitrogenous food, forming chiefly muscles and the nitrogenous part of the nervous system, and your carbo-hydrates, forming heat and the necessary fat as a store for emergencies. You should thus avoid all indigestible and useless material.

Nature tells us how much food we require. When our natural appetite has been satisfied with plain good food, we have had all that is necessary for the restoration of the tissues. Have no pickles or sauces on the table, as they stimulate to eating beyond the true appetite. Also limit the meal

to two or three dishes, as a too great variety of foods, possessing a variety of flavours, stimulates to eating beyond the natural appetite. It is better to eat too little than too much. Stale bread is better than new, because, during mastication, it can be more thoroughly broken up, so that the saliva can more freely penetrate and act on it. New bread is liable to be worked up into a doughy ball, and merely externally acted on. Remember, our bodies are nourished, not by what we eat, but by what we digest.

As to the times of eating, three or four hours is the ordinary time needed for the digestion of a meal in the stomach. Always rest and have a nap, if possible, after eating ; animals always do.

If a man has been living a very different kind of life, it is a mistake to change his habits too suddenly, even if the change be for the better.

Having now dealt with the solids, we go on to the liquids. More than two-thirds of every one of you is water. In a man of twelve stone, there is more than eight stone of water. Now a man, on an average, in ordinary every-day life, loses six pounds of water daily ; and this amount is largely increased when he is undergoing any violent exercise. This large loss is in part supplied by the so called solid food which we eat, for out of every hundred parts of lean beef, seventy-two are water, the others being nineteen of albumen, four of fat, and five of salts. The rest of the liquid needed we take by drinking.

Water alone would be sufficient ; but habit and taste require the addition of certain flavourings, as tea, coffee, etc. Tea in moderation is a stimulant, and contains an oil to which it owes its peculiar aroma, an astringent of the nature of tannin, and an alkaloid, theine. The composition of coffee is very nearly similar to that of tea. Cocoa, in addition to similar substances found in tea and coffee, contains fat, albuminous matter, and starch, and must be looked upon more as a food.

The amount of liquid to be drunk should be to a great extent regulated by nature's desires, bearing in mind only that no more should be taken than the stomach can readily absorb, as unabsorbed fluid retards digestion, distends the stomach, and is bad for what is popularly known as the "wind." Here, too, we must distinguish between local and constitutional thirst. The local thirst in the back of the throat, caused by rapid breathing of a warm atmosphere impregnated with dust, or like circumstances, must be allayed, not by large draughts of liquid,—which, by passing into the body, would produce the ill effects above mentioned,—but by first thoroughly washing out the mouth, and by swallowing slowly a small quantity of fluid. Constitutional thirst, which is caused by the disproportionately small quantity of water in the blood, should be quenched by moderate draughts of some non-alcoholic liquid, always taking care not to drink too much. No fluid should ever be taken above the temperature of 100° Fahrenheit.

It is almost needless to say that during a course of training, neither alcohol nor tobacco should be touched. The advocates for the use of alcohol make, however, a claim, that at the end of a long and trying race it stimulates exhausted nature to still further efforts. The reply to that I will not attempt myself, but will give in the words of one of the greatest masters of medical science, the late Sir Benjamin Brodie, who, speaking of the temporary relief obtained by alcoholic stimulants, says, "Stimulants do not create nervous power ; they merely enable you, as it were, to use up that which is left ; and then they leave you more in need than you were before."

I pass now to the subject of clothing. In this we have to consider material and form. The material's should be woollen and porous; the form as thoroughly adapted as possible not to catch the wind, and yet to leave all the joints free play. As to the best material, there is a very good test, which our President (Dr. W. B. Richardson) has published. This consists in simply taking a bit of the stuff and breathing through it. If, he says, it is an effort for the lungs to breathe through it, it is a still greater effort for the skin; and a choice should, therefore, be made of the substance through which the breath passes as freely as if there was nothing in the way. A cricket cap may be worn, or not, according to the taste of the rider. Well-fitting shoes should be worn, as boots cramp the ankles; they must be made as light as possible, but must have a stiff sole, with bars of leather crossed at right angles, to fit, and to give a firm grip of, the pedal. They should also lace from the toe, as high up the foot as is possible without interfering with the free play of the ankles, in order to give as much support as they can.

We now come to sleeping. The amount of time required for sleep varies, not only with individuals, but with the same individual at different periods of his life, and is influenced by various causes, such as exercise, and so on. It is pretty generally agreed that most sleep is required while the body is growing, and when, after being full-grown, it is most active. The cyclist, therefore, in training should take a full amount of sleep, say eight hours out of the twenty-four.

This has a good effect, not only in sustaining the strength, but in keeping the senses of seeing, hearing, and feeling in steady and healthful tone. Sleep is better, too, when taken in the early part of the night. It is better to sleep in a warm room than in a very warm bed, because too many bed-clothes lead to suppressed perspiration and nervous exhaustion.

On the matter of exercise, one great question has to be settled. Is it good in training to combine other exercises with that of cycling? The answer to this is, as I think, that if the exercise added to cycling be not excessive, and if it be carefully selected, it is good. The by exercise (if I may so call it) ought not to weary the lower limbs; that is a cardinal point; but it may with advantage bring into play the muscles of the chest and upper limbs. Dumb-bell or Indian club exercise is excellent; and I recommend every man, after his morning bath, to take at least ten minutes with the dumb-bells or clubs, throwing the arms well out so as to get good expansion of the chest. Gentle walking is good for a mile or so before breakfast, but not more. Never take any violent exercise till about three or four hours after a full meal.

Next comes the knotty point as to whether the rider intends training for handicaps or scratch races. If he is training for handicaps, where the stronger rider gives the weaker one a start, he should mount his machine and ride the whole distance at his top speed, and then dismount. If the race is a scratch race, where no starts are allowed and all ride the same distance, the rider, according to his ability, tact, and judgment, may take one of two courses. If he be a powerful man, or possess great staying powers, without much capability of spurring, he will ride the whole distance at his top speed, and by so doing, try to tire his weaker competitors, who may be faster on the spurt than himself. Should he, on the other hand, be a comparatively feeble rider, or a muscular man without much staying

power, he will reserve his strength by every means in his power for the final spurt. Now the training required by the goer-all-the-way in scratch races is exactly the same as that of the handicap-rider ; namely, he traverses the entire distance at his top speed. If, on the other hand, he decides to wait on the goer all through, and try to spurt him at the end, he should practise short, sharp bursts of speed, varied by a half and three-quarters pace work, always finishing up with a sharp spurt. I think that anyone who naturally belongs to either class of rider, namely, the waiter or the pacemaker, injures his chances of success by forcing his training towards the other class. The amount of work taken on the machine should, of course, be regulated by the physical qualities of the rider ; if he has a hearty appetite for his meals, he is not doing too much work ; but directly the appetite falls off, the amount of work should also be lessened. Nature is the best guide to the amount of work a man should do ; but he must not take too violent exercise at the beginning of a course of training, and should never ride until a fit of coughing is produced. In racing, I would say to the pacemaker, if he feels done, "Think that those behind you are still more tired." To the waiter I would say, "If possible, ride second or third, and try by all means in your power to get a good position for the final spurt."

The great thing in riding at a high speed is, to get the greatest pace with the least amount of exertion. Everything that can save muscular effort should be taken into account. Do not let your machine be heavier than is consistent with strength and rigidity ; let every frictional part be provided with perfectly fitted ball-bearings, so as to reduce friction to a minimum, and let the rider lean forward so as not to offer more resistance to the wind than is absolutely necessary. In rapid riding the resistance caused by the friction of the tyre with the ground, and the friction of the bearings, is simply nothing when compared to the resistance of the wind. If any one doubts my word, let him ride for a mile or so against a strong head wind, and then turn round and run before it. The difference is little short of marvellous. Then, as to the best method of applying muscular power. First, let the reach of the bicycle or tricycle be of such a length that the rider can easily touch the pedal when it is at its lowest point with his heel. Then, let his cranks be as long as possible, without giving the feet any tendency to fly off the pedals, and causing the wheel to wobble when spurting at top speed. Also let the saddle be comfortable, and the handles of a length and bend suitable to the reach of the rider's arms. The triangle formed by the saddle, handles, and pedals, is an all-important one ; and if it is not correct, the rider will never be comfortable. Let his knees work straight up and down : any turning of them in or out means loss of power. One of the difficulties of pedalling at a high speed is, that a man pushes his pedals down and does not stop there, but bears slightly on them when they are coming up. This, of course, retards the pace of the machine. This habit must be overcome by carrying out the following directions. When the pedal is at its highest, the rider should drop his heel, and so help to push the crank past the dead centre. Again, when the pedal is at its lowest, the rider should raise his heel, and so help to pull or claw the crank past the dead centre. This is a very important point, and should be practised in an exaggerated style till it is thoroughly acquired. When a rider can perform the action of "ankling" well, he will find that he has put at least a mile an hour on to his speed. His position on the

machine should be as easy as possible; body in a rather crouching position, leaning well forward, and yet the weight kept back as much as possible. The elbows should be slightly turned out, so as to keep the chest well open. When spurring, take a good grip on your handles with the fingers uppermost, and the elbows firmly tucked into the sides, and every muscle set. No race can be ridden by rule of thumb. You *must* think about the race while you are riding it, keeping your eyes open, and taking advantage of any mistake in judgment that an opponent may make, saving yourself as much as possible, always trying your hardest to win, and never forgetting that you are a *sportsman* and a *gentleman*. After a race a man should be well rubbed down, as rubbing aids the circulation of the blood through the muscles, and so helps to carry off the waste products of muscular action, and to renovate the muscles themselves. The astringent lotions and embrocations that racing men are so fond of anointing themselves with are quite useless, and should only be used when a ligament or muscle is strained.

I next pass on to make an admission, which is, that in sport, a good deal of mischief has been done by what is medically called overstrain, both of nerve and muscle, owing to the ignorance that has prevailed on a new subject, as to the mode of preparing for competitive feats. I notice that the senior members of the profession I am studying, are given to express much concern, at times, respecting the injury that is done by severe contests. Perhaps they think more of these evils than we young men do, because *we* see such an immense number of races in which no injury follows, while *they* only have before them the exceptional examples of the harm done, so that the question of frequency does not enter into their reckoning. I do not say this to suggest that there is no danger, but rather to testify that, in cycling, whatsoever danger exists, is not greater than in any other sports and pastimes where men match men in athletic struggles. In fact, when you compare cycling with rowing, in which a long object like a boat has to be forced through a strongly resisting medium like water, it is quite clear that far more strain on the muscles and vital power is entailed, than in cycling. Again, take running; in this, as the weight of the body has to be supported by the legs, as well as carried upright at a rapid pace through the air, without any such mechanical help as you have in cycling, there must be also a far greater strain on the muscles than in cycling.

In conclusion I may say that, in cycling, racing has unquestionably led to great improvement in the construction of machines. And I hope I am not saying too much if I venture an opinion that, if there had been no cycle-racing, it would have taken half a century to bring the art of cycle-making to the point which it has at present attained. Moreover, I think it will be admitted by all who use the bicycle or tricycle exclusively for purposes of pleasure, that the fastest machine is the easiest to drive. Therefore, the best racing machine will, with certain modifications, make the best roadster.

To sum up, the object of training, as my most excellent trainer Harry Leeming, of Manchester, says, is to get the body, muscles, and vital organs to the highest pitch of health and strength, by regular living, exercise, and practice of those qualities of endurance, speed, and judgment which will take a man first past the winning post, ahead of the best of his opponents.