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Yoga=Mimānsā

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UJJĀYĪ PRĀṆĀYĀMA EXPLAINED

IN this article we propose to offer physiological explanations for the different parts of the technique of Ujjāyī. Research work required to be done for a clear and thorough understanding of any type of Prāṇāyāma is so vast, that we have not succeeded in covering even a small fraction of it. However, we think it desirable to present to our readers whatever we could understand of the physiology of Ujjāyī from our researches and reserve further explanations for the time when additional investigation would be done. In discussing the physiology of Ujjāyī, we might discuss some of the points common to all varieties of Prāṇāyāma.

First we shall try to understand scientifically the question of the posture required to be assumed, in Ujjāyī. On p. 272 of the third volume, we have stated that Ujjāyī can be practised either in sitting or in standing or even in walking. There we have also pointed out that these options are available for a physical culturist only. A spiritual culturist has been advised to prefer the sitting posture. Before discussing the physiological aspects of these different positions of the body, we shall notice two features which are common to them all.

A physical culturist as well as a spiritual culturist, practising Ujjāyī has to keep his spine erect, whether the exercise is gone through while one is sitting, standing or walking, being immaterial. We have discussed at length the physiology of this part of the technique of Ujjāyī in our article on the meditative poses in the last two issues. There we have rejected the view which holds that the erect spine is essential for the right functioning of the spinal cord. It has been pointed out in that article that even in the most erect position of the spine, that organ continues to have two natural curves which cannot be effaced and that the right functioning of the spinal cord is not interfered

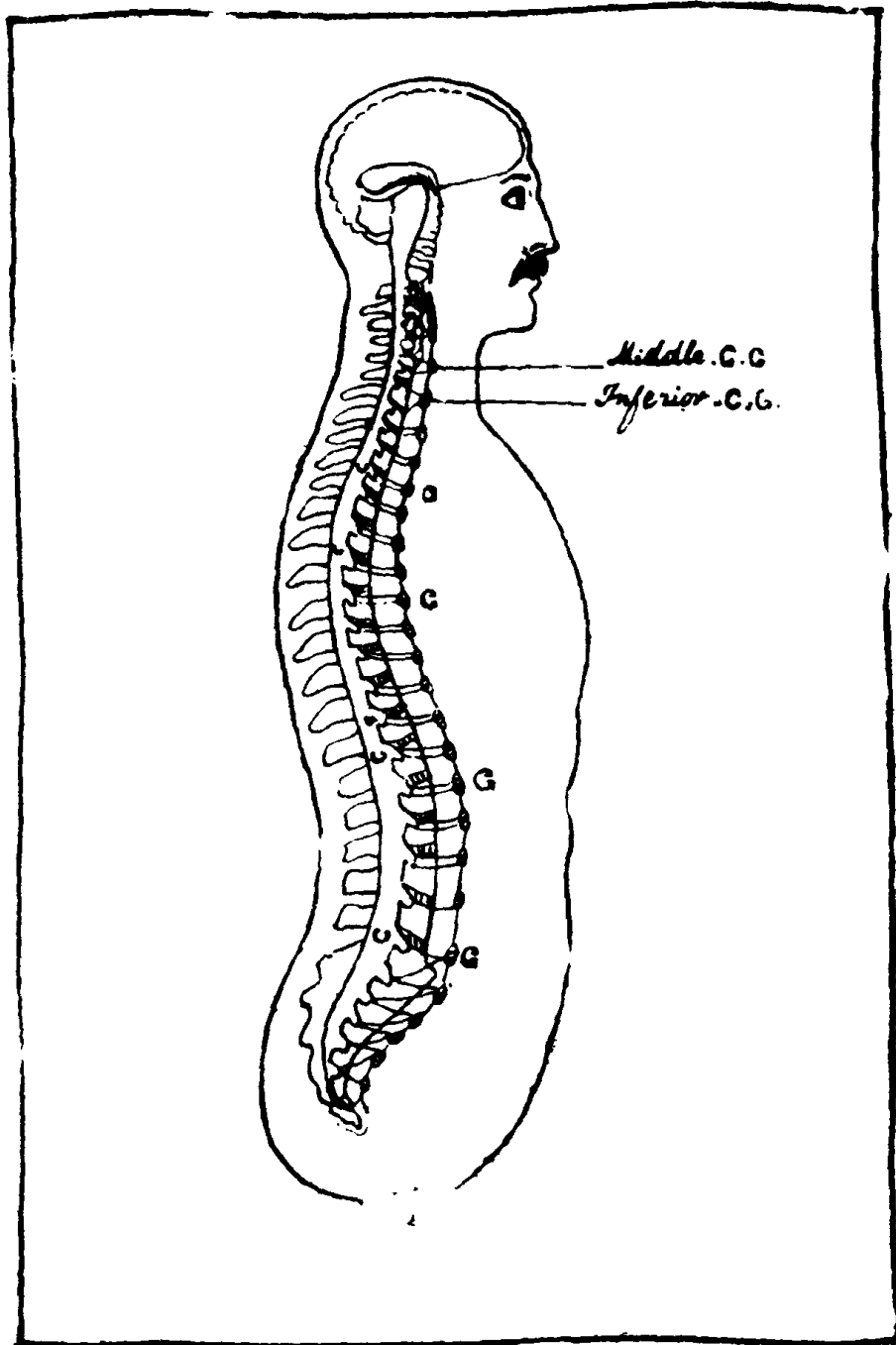
with by any spinal curves at all. Fig. XI illustrates the natural curves in the vertebral column. In the same article we have shown that owing to the surrounding membranes, the fluid, and the fatty tissues, the spinal cord is left unaffected by any bends, shocks or jerks of the spine. After thus criticizing the popular view, we have advanced our own view regarding the physiological advantages of an erect spine. The elimination of the possibility of the compression of abdominal viscera was claimed to be the principal advantage of an erect spine. The other advantage pointed out there, is the minimizing of the spinal burden. It has been stated that an erect posture puts minimum burden on the spine.

There is, however, a third advantage in keeping the spine erect. It ensures freedom for the diaphragm in its respiratory movements. When a man sits stooping, the compressed abdominal viscera seriously interfere with the movements of the diaphragm. All the three advantages due to the erect spine must be secured by a student of Yogic culture, whether he practises Ujjāyī in sitting, standing or walking.

When Ujjāyī is practised while one is standing or walking, one is likely to commit the following error as regards the position of the spine. A student of Yoga is likely to throw out his chest as shown in Fig. XII, and give his spine a backward bent. This is physiologically incorrect. In throwing out his chest, the student stretches his abdominal muscles which cannot, therefore, move freely and thus interfere with respiration. Fig. XIII represents the correct standing position for the exercise of Ujjāyī.

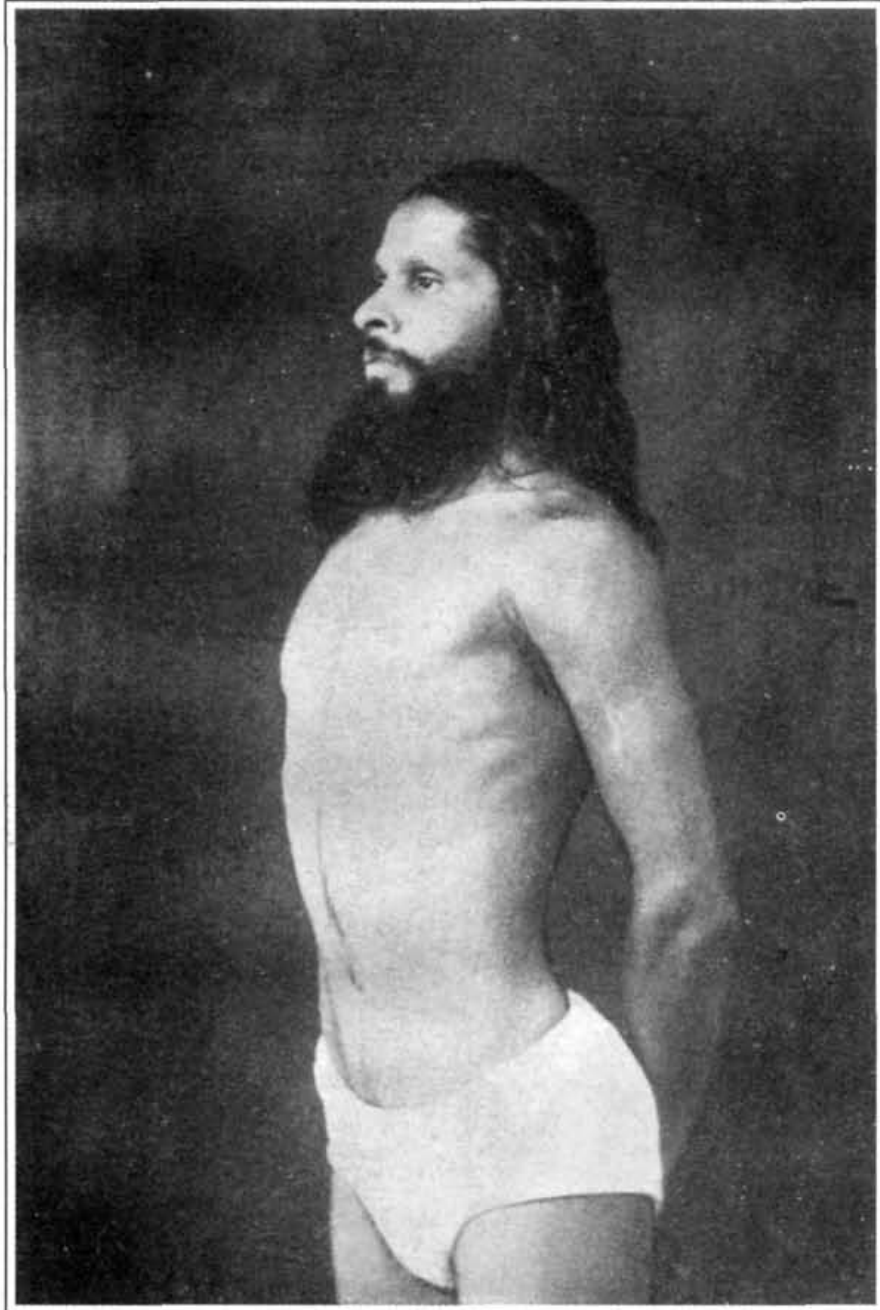
Having considered the advantages of an erect spine, we now proceed to discuss the physiological significance of the position of the hands. In Ujjāyī, the hands must rest on the knees as shown in Fig. LXXII or LXXIV in the third volume, if Prānāyāma is being practised in sitting. Or they may rest in front as illustrated in Fig. XIV. If the exercise is being undergone while the student is standing or walking, the hands

Fig. XI



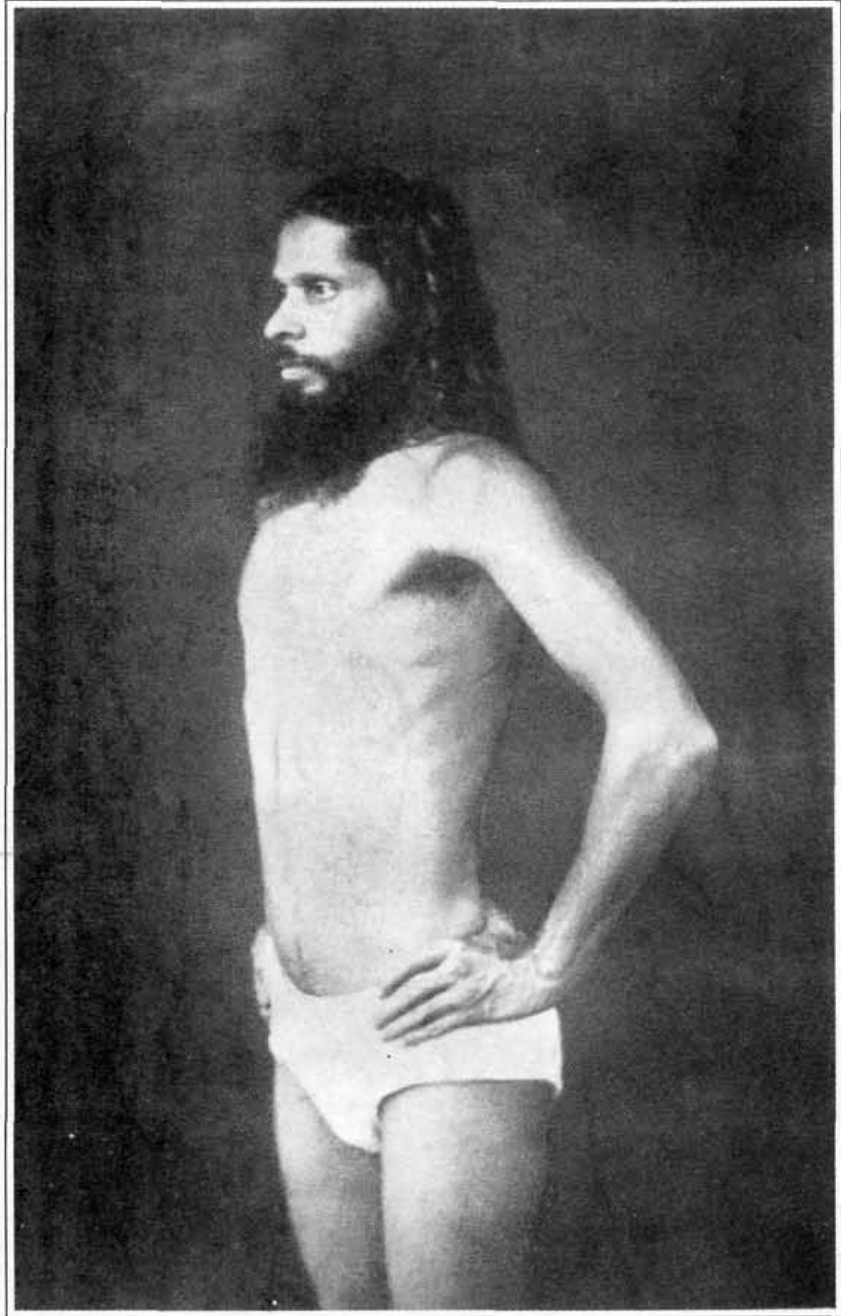
The Spine.

Fig. XII



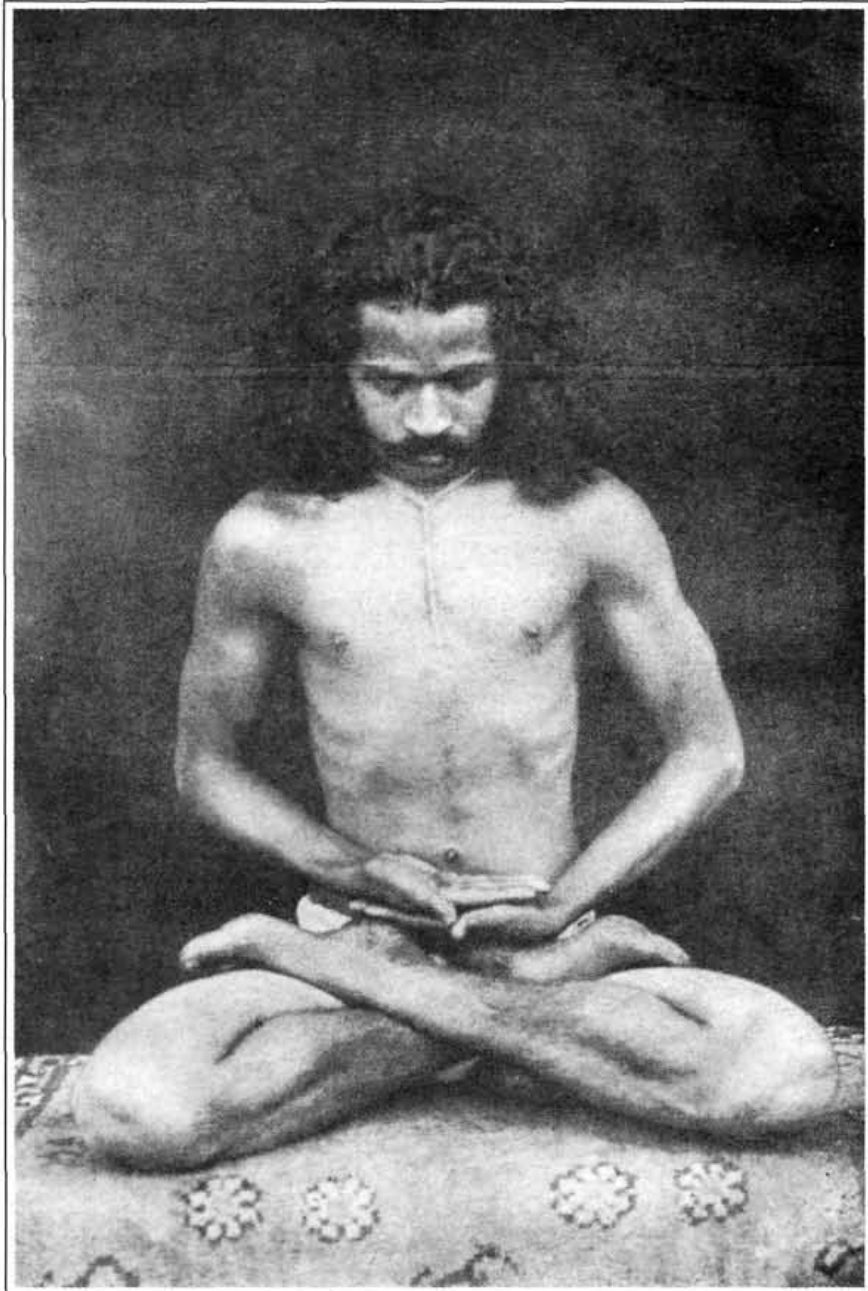
Chest Thrown out in Standing.

Fig. XIII



Correct Standing Position for Ujjāyī

Fig. XIV



Hands Resting in Front.

must rest on the iliac bones as pictured in Fig. XIII. If the full orthodox technique is to be strictly followed, during exhalation the right hand may rest on the nose. Under no circumstances should the hands hang from the shoulders, thus putting their burden on the chest.

For any exercise in respiration whether it is Prāṇāyāma or any other type of breathing, the chest must be entirely free from burden, so that the respiratory movements may be as complete as possible. Hands, if they keep hanging from the shoulders, do put a burden upon the chest and do not allow inspiration as thorough as it would otherwise be. When the hands are given any of the resting positions pointed out above, this burden is partly removed and a freer inhalation is the result. Any one that practises Ujjāyī first with hands hanging and then with hands resting, can easily verify this statement. When the exercise is to continue for a considerable length of time, the burden of the hanging hands begins to be felt seriously. It is, however, immediately relieved, if the hands are given any of the resting positions available in this practice. Weak persons sitting in the meditative poses for a long time, will find it more comfortable to rest the hands in front than to rest them on the knees.

After the spine and the hands, the abdominal muscles come up for consideration. We mean the muscles comprising the front wall of the abdomen. We wish to examine Prāṇāyāma mainly for two values, for the oxygen value and for the nerve culture value. So the study of the abdominal muscles will also proceed from the point of view of these two values.

Taking for our examination the oxygen value first, we have to determine which position of the abdominal muscles will enable a student to inhale a larger quantity of oxygen for his system. Two positions have been advocated for inhalation. Western physical culturists, so far as we know, recommend the muscles to be relaxed and kept protracted, being

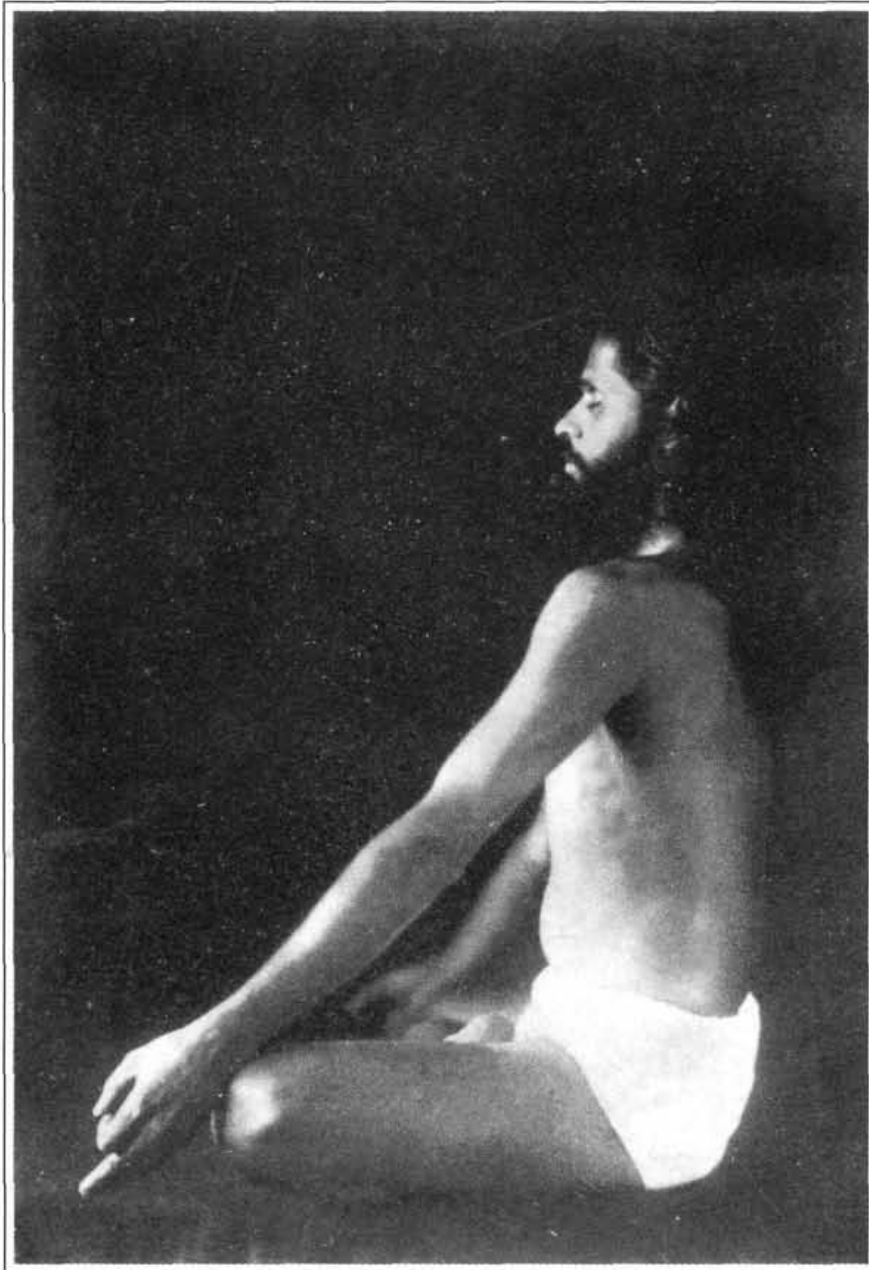
pushed out by the abdominal viscera. Yogic technique requires these muscles to be kept controlled. Figs. XV and XVI respectively illustrate the protracted abdomen and the controlled abdomen in inhalation. Which of the two positions of the abdominal muscles will secure more oxygen in inhalation ?

Western physical culturists have claimed that the protracted abdomen allows the diaphragm to descend lower, thus ensuring larger thoracic capacity and a richer quantity of oxygen in inhalation. According to them the controlled abdominal muscles will retard the diaphragmatic descent and thus would lead to a smaller expansion of the thorax and a lesser quantity of oxygen in inhalation. We have performed a number of experiments in this connection and we have found that the position taken by the Western physical culturists is more imaginary than real.

For verification we have to revert to Experiments V and VII given in the Scientific Section of this issue. There we have studied the intra-oesophageal pressure caused by inhalation, both with protracted abdomen and with controlled abdomen. In the case of the controlled abdomen, the intra-oesophageal pressure turned out to be -21.2 mm. of mercury whereas in the case of the protracted abdomen it was found to be -16.88 mm. of mercury. Now as shown in our article on the pressure changes in Prāṇāyāma, there is *correspondence* in their variations between the intra-oesophageal pressure and the intra-pulmonic pressure. Hence we can conclude that the fall in the intra-pulmonic pressure, is *greater* in inhalations with controlled abdomen than in inhalations with protracted abdomen. These results lead us to the conclusion that the pulmonic capacity becomes much larger in inhalations with controlled abdomen than in inhalations with protracted abdomen. That means, one is able to inhale larger quantities of oxygen when the abdomen is kept controlled than when the abdomen is kept protracted.

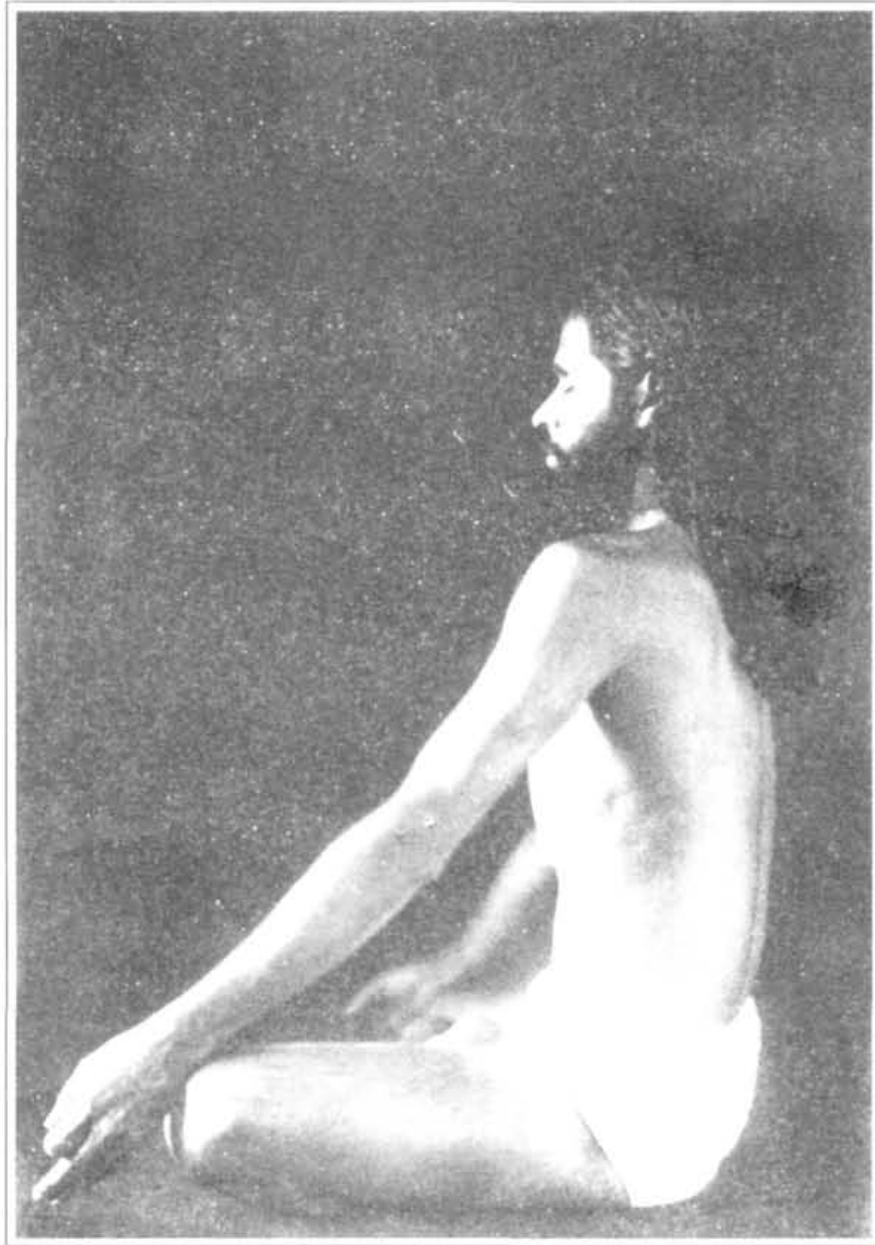
We have discussed the reason of this phenomenon in our remarks on Experiment VII. It is this: The protracted ab-

Fig. XV



Protracted Abdomen in Inhalation.
(Side View)

Fig. XVI



Controlled Abdomen in Inhalation.
(Side View)

domen does, indeed, allow the diaphragm to descend lower than the controlled abdomen, but the protracted abdomen depresses the ribs, and this more than counterbalances, the advantage gained by the lower descent of the diaphragm. Without going into details, we may also point out, that the X-Ray experiments on the diaphragm and the ribs published in the third volume lead to the same conclusion as the experiments on pressure changes published in the current number. Thus we find that all experimental evidence conclusively proves that with the controlled abdomen one secures a larger quantity of oxygen in his inhalation than with the protracted abdomen. That is the reason why we think that the position taken up by the Western physical culturists is more imaginary than real. Thus we see that the Yogic technique of inhalation is physiologically sound, so far as the oxygen value is concerned.

(To be continued)

A SHORT COURSE
in
YOGIC PHYSICAL CULTURE

- | | | | |
|---|------------------------------|---|---|
| 1 | Bhujāṅgāsana | { | 3 to 7 turns each; the pose being maintained for 2 to 5 seconds, one more turn being added to each, every fortnight. First only Ardha-Halāsana to be tried for 2 seconds in each stage. Then the full pose may be taken through the four different stages, each stage being maintained for 2 seconds only. 3 to 5 turns, adding one turn every fortnight. |
| 2 | Ardha-S'ala-
bhāsana | | |
| 3 | Dhanurāsana | | |
| 4 | Halāsana | | |
| 5 | Pas'chimatāna | { | To be maintained for 5 seconds. 3 to 7 turns, adding one turn every fortnight. |
| 6 | Ardha-Matsyendra-
drāsana | { | To be maintained for 5 seconds. 3 to 7 turns, adding one turn every fortnight. |
| 7 | Yoga-Mudrā or
Uḍḍiyāna | { | To be maintained for 10 seconds. 3 to 5 turns, adding one turn per week.. |
| 8 | Viparīta Karanī | { | First Ardha to be practised with 2 seconds' pause at every stage. Afterwards the full pose to be taken with 10 seconds' pause. 2 to 5 turns, adding one turn every fortnight. |
| 9 | Ujjāyī | { | 7 to 21 turns, adding 3 per week. |

A FEW GENERAL HINTS

1 This Short Course is framed for those people who cannot, for want of time, strength or wish, follow the Complete Course given on pp. 288-292 of the second volume.

2 All the hints given to Yogic physical culturists in the Complete Course should be applicable to this Short Course also.