while the paths of the nerves are obstructed. I suspect that these movements are sometimes convulsive because the nerves are irritated by some fermentation of the juices which they contain in their tubules. This can occur mostly during sleep.

The problem of the sleep-walkers is certainly more difficult to solve. Sensitive perceptions of external objects are completely impeded and motive juice to contract the muscles cannot at all be instilled freely. Perhaps the boiling nutritive juices are too narcotic in sleep-walkers. They numb sensations but cannot really refrain the motive force because the imagination instead of the will orders movements which are carried out normally by acquired habit.

Chapter XII

On semen, its genesis, movement and nature.

After discussing the animal spirits which originate in the brain and their motions we must deal with spirits of another kind, the very lively and unctuous semen which is made in the testicles. We shall discuss its origin, movements and nature.

Proposition CLXVI

Structure of the testicles as discovered recently.

The ancient anatomists investigated the structure and function of the testicles rather carelessly. Some said that they are masses of flesh and were made by Nature for nothing else than to dilate vessels by their weight. Others believed that they are workshops for semen. They thought either that serum is sucked from semen by the spongy structure of their pores (Galen bitterly opposed this view) or that blood or lymph is changed into semen by their medullary and glandulous substance.

Recent and accurate anatomical observations clearly refuted all these views of the imagination. The famous Auberio when he taught anatomy in Pisa, on the ides of May 1657, showed to myself, the famous Malpighi and others, that all the mass of a boiled testicle of a sheep consists of countless white columnar filaments, like worms, extending from both nervous envelopes to the median axis of the testicle. These fibres were full of white semen. Slightly squeezed they secreted semen drop by drop. This appeared even more clearly in the testicles of a wild boar killed by order of Ferdinand the second, Grand Duke of Tuscany, at the time when these animals use to mate. Then their testicles are considerably swollen by semen and the vessels which are as large as the quills of chicken feathers are obvious without any preparation as a result of blood caught between the white fibres.
At my suggestion Auberio published the same year this beautiful observation which he illustrated by an elegant copper-plate of Florence.

Actually, since nobody must be deprived of the glory which he deserves, the famous R. de Graaf ulteriorly in 1668 published the same structure of the testicles and discovered many remarkable facts which had not been noticed by Auberio. He observed that part of the spermatic arteries penetrate the substance itself of the testicles and part of these arteries irrigate the epididymis and the tunica albuginea. This appears after injection of coloured water with a syringe. He unfolded the duct of the epididymis into a greater length than Auberio did. He also saw the foramen epididymis. He made visible its tortuous and serpentine prolongation by injecting water with a syringe. He, moreover, made other beautiful observations.

From the observations of these famous authors we know that arteries carry blood to the testicles, that proper white nervous vessels constitute the substance of the testicles. These vessels prolong into a nervous duct extending over the axis and then into the single very long canal of the epididymis. They end in the ductus deferens which discharges semen in the seminal vesicles. From there the semen is spilled into the urethra together with the liquid secreted by the prostate.

**Proposition CLXVII**

Structure of the seminal ducts.

The naked eye cannot see the composition and intimate structure of the wormy small columns which compose the mass of the testicle. It is surmised, however, that these columns are not simply perforated tubes like reeds so that semen just flows through them as blood flows through the arteries and veins. They seem to be filled by some spongy substance. Hence it is conjectured that the milky juice which they contain does not flow spontaneously from their ducts but requires some squeezing. Similarly, we express water from a wet cloth by squeezing it with our hands.

This has been confirmed. A testicle divided into two, even when compressed and squeezed considerably, retains, nevertheless, a considerable volume. Therefore, the columns were not filled by liquid alone but were made turgid by a thick mass of spongy substance.

If their internal cavities were hollow and smooth like those of the arteries and veins, blood could not be transformed into spermatic liquid. It seems more likely that these spongy areas are similar to honeycombs full of some liquid ferments. The prolonged action of these ferments transforms the blood into very unctuous and lively semen. The origin and continuous progression of these small columns cannot be seen but it is likely that they are rooted in the tunica albuginea. There they suck from the blood a glutinous white juice together with its albugineous liquid. These bloody liquids are also sucked from the arterial capillaries through their lateral pores. Therefore, many small veins are disseminated throughout the internal substance of the testicle to retrieve