From: Kapandji, *The Physiology of the Joints, Volume Three, The Trunk and the Vertebral Column,* Second Edition, (1974) Churchill Livingstone, pp.64-65.

NUTATION AND COUNTER-NUTATION

Before studying the movements at the sacro-iliac joint it is wise to recall that their range is small and *varies according to circumstances and the subject*, which explains the lack of agreement regarding the function of this joint and the relevance of its movements during labour. These movements were first described by Zaglas in 1851 and by Duncan in 1854.

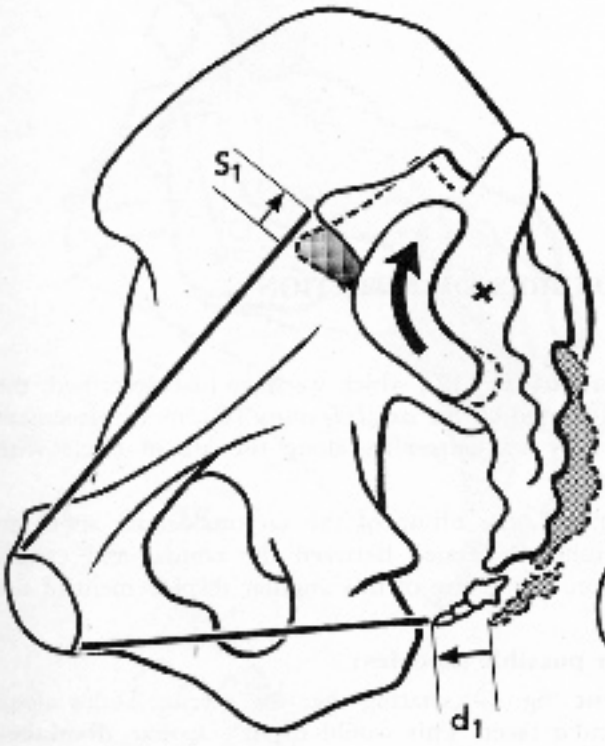
The Classical Theory of Nutation and Counter-Nutation

During the movement of nutation (fig. 15) the sacrum rotates about an axis constituted by the axial ligament (shown as a cross) so that the promontory moves inferiorly and anteriorly (S_2), while the apex of the sacrum and the tip of the coccyx move posteriorly (d_2). Thus the antero-posterior diameter of the pelvic brim is reduced by a distance S_2 while the antero-posterior diameter of the pelvic outlet is increased by a distance d_2. Meanwhile (fig. 16), the iliac bones are approximated whereas the ischial tuberosities move apart. The movement of nutation (fig. 13) is limited by the tension developed in the sacrotuberous (7) and sacrospinous (6) ligaments as well as the anterosuperior (8) and anteroinferior (9) bands of the anterior sacro-iliac ligament.

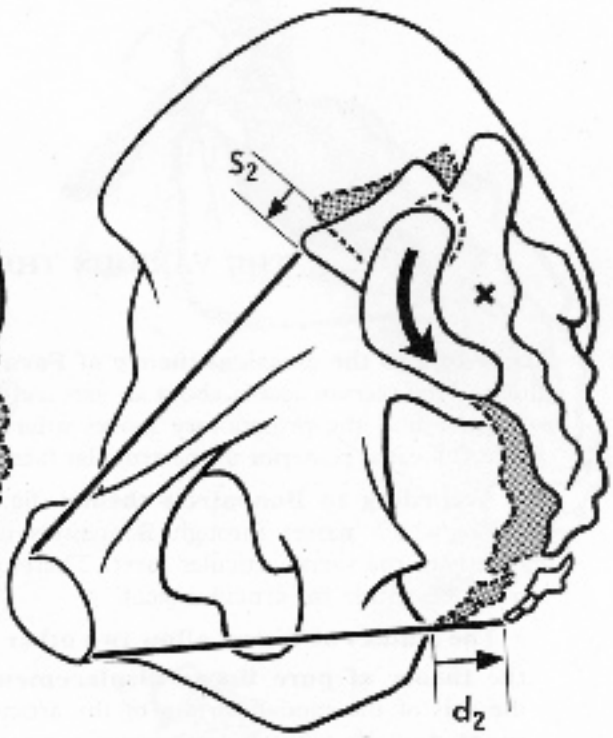
The movement of counter-nutation (fig. 14) involves displacements in the opposite direction. The sacrum, pivoting around the axial ligament, rights itself so that the promontory moves superiorly and posteriorly (S_1) and the apex of the sacrum and the tip of the coccyx move inferiorly and anteriorly (d_1). As a result the anteroposterior diameter of the pelvic brim is increased by a distance S_1 while that of the pelvic outlet is reduced by a distance d_1. Also the iliac bones move apart and the ischial tuberosities are drawn together. The movement of counter-nutation (fig. 13) is limited by the tension developed in the sacro-iliac ligaments both in the anterior (1) and posterior (4) planes.

For example, the change in the anteroposterior diameter of the pelvic brim amounts to 5 mm according to Bonnaire, Pinard and Pinzani, and to 8–13 mm according to Walcher. The change in the anteroposterior diameter of the pelvic outlet can amount to 15 mm according to Borcel and Fernstrom and 17.5 mm according to Thoms. The lateral displacement of the iliac bones and ischial tuberosities has recently been confirmed by Weisel.

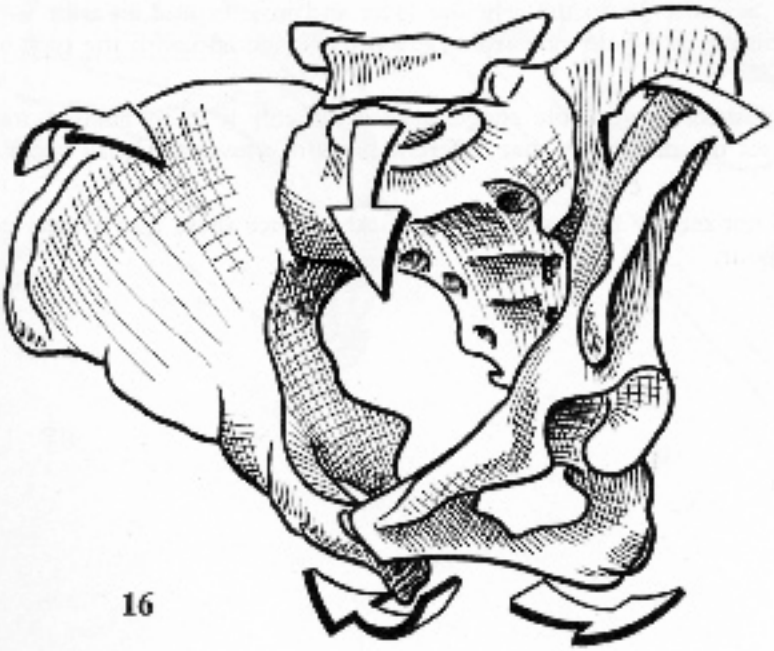
Nutation (Lat. **nutare** = to nod) describes a complex movement of the sacrum analogous to nodding of the head.



14



15



16