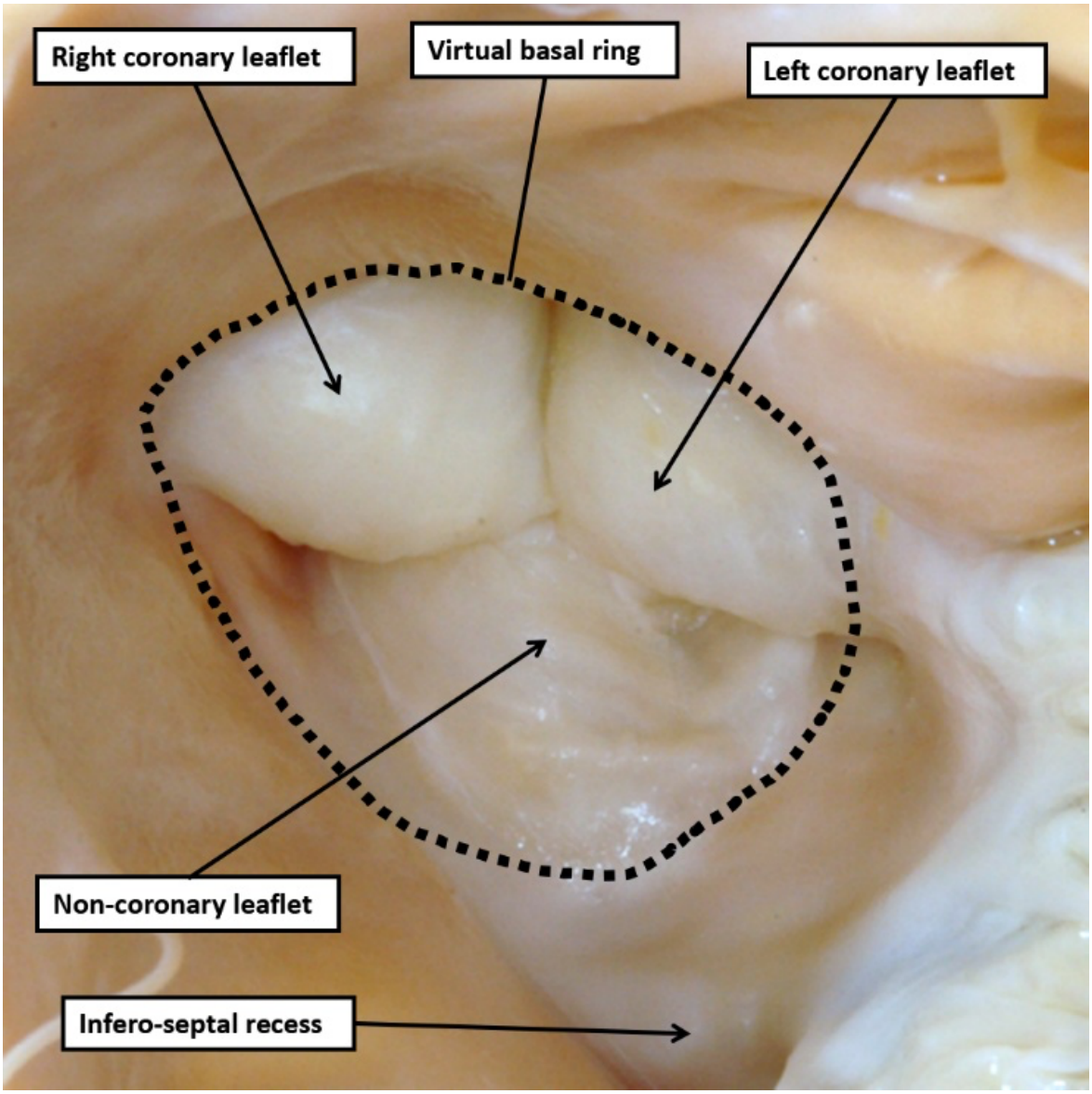
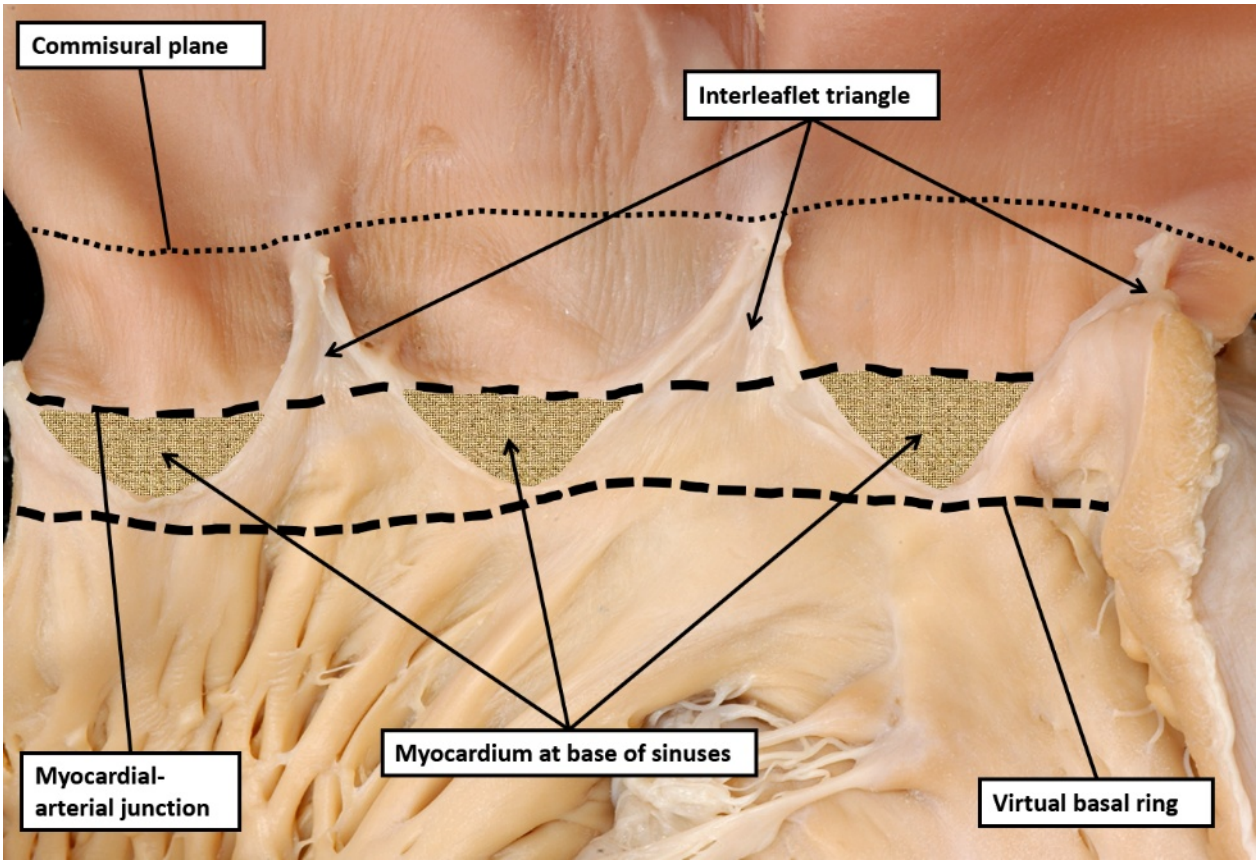
Supplementary Material

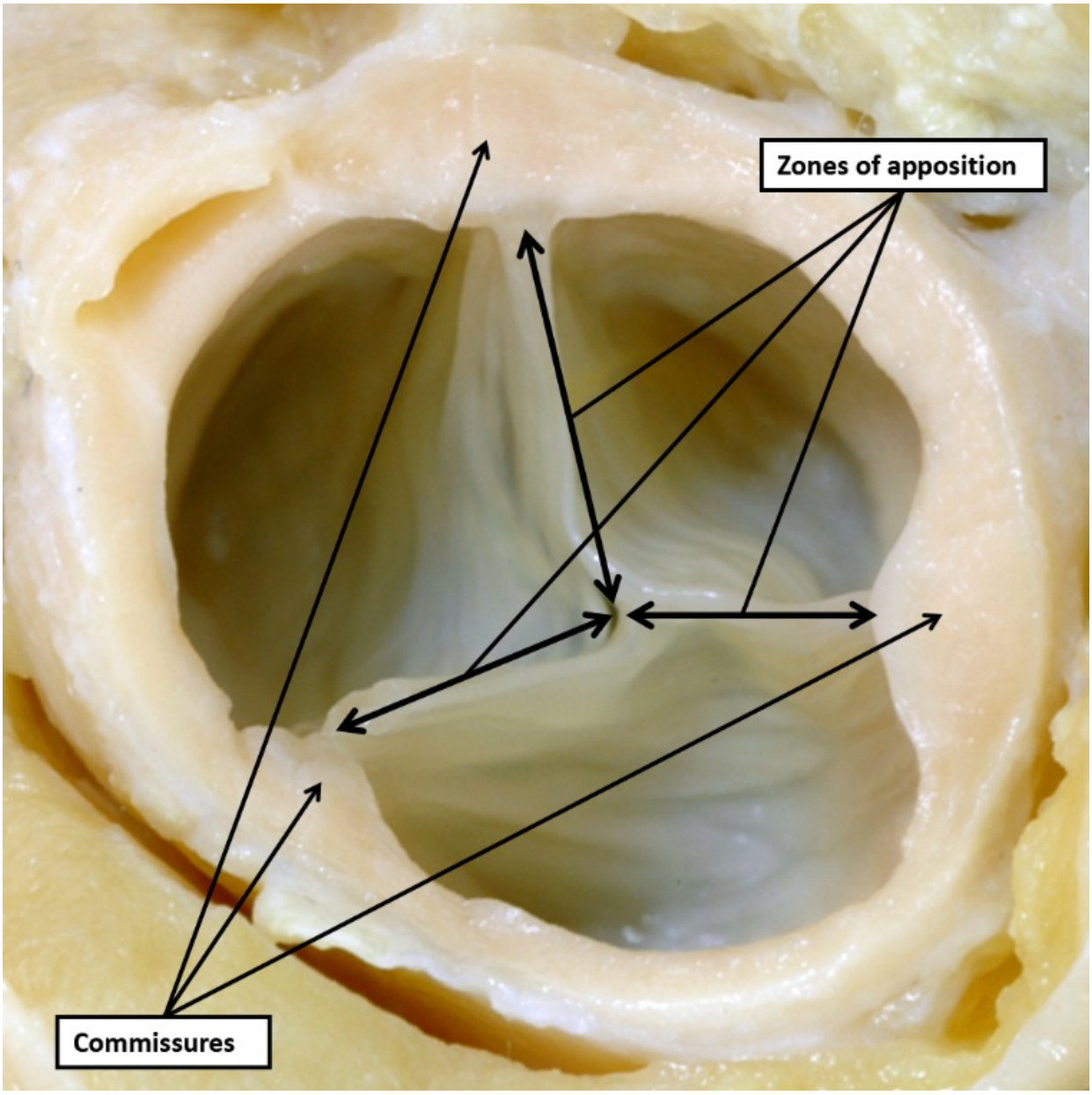
Supplementary Figure 1. The image shows the aortic root viewed from the ventricular aspect, with the leaflets of the aortic valve in their closed position. The resemblance of the surfaces of the leaflets to the surfaces of the molar teeth offers an explanation as to why the leaflets were initially described as being "cusps". A similar arrangement is observed when the tricuspid valve is viewed in closed position from its atrial aspect. The photograph also shows the infero-septal recess, which is an extension of the left ventricular outflow tract, but not part of the aortic root. The proximal boundary of the root is a virtual basal ring, constructed by joining together the nadirs of the semilunar valvar leaflets (black dashed ring). Note that extensions of the cavity of the outflow tract extend between the semilunar hinges towards the sinotubular junction. These extensions have fibrous walls, and are the interleaflet triangles. There is also a central peak at the site of the centroid of the valvar orifice.



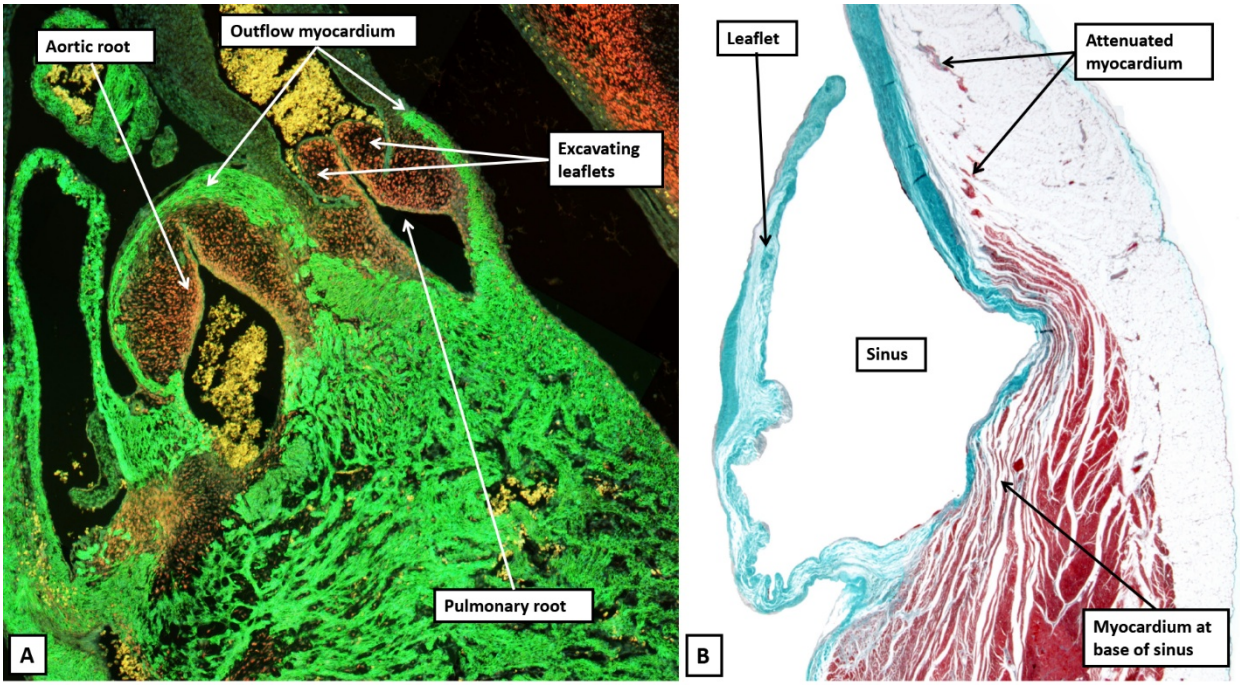
Supplementary Figure 2. As with the heart shown in Figure 2, the pulmonary root has been opened and spread to show its component parts. In this heart, however, the valvar leaflets have been removed, leaving only their semilunar hinges. This makes it easier to recognise the myocardial-arterial junction. When the root is closed, it forms an obvious circle. Joining together the levels of the commissures creates another circle, which is the commissural plane. The sinotubular junction itself extends distally relative to the commissural plane at the mid-points of each sinus. Joining together the zeniths of the sinuses creates the virtual tubular plane. The proximal boundary of the root, again circular, is anatomically another virtual entity. It is constructed by joining together the nadirs of the valvar hinges. It is this virtual basal ring that is recognised by echocardiographers as the valvar annulus.



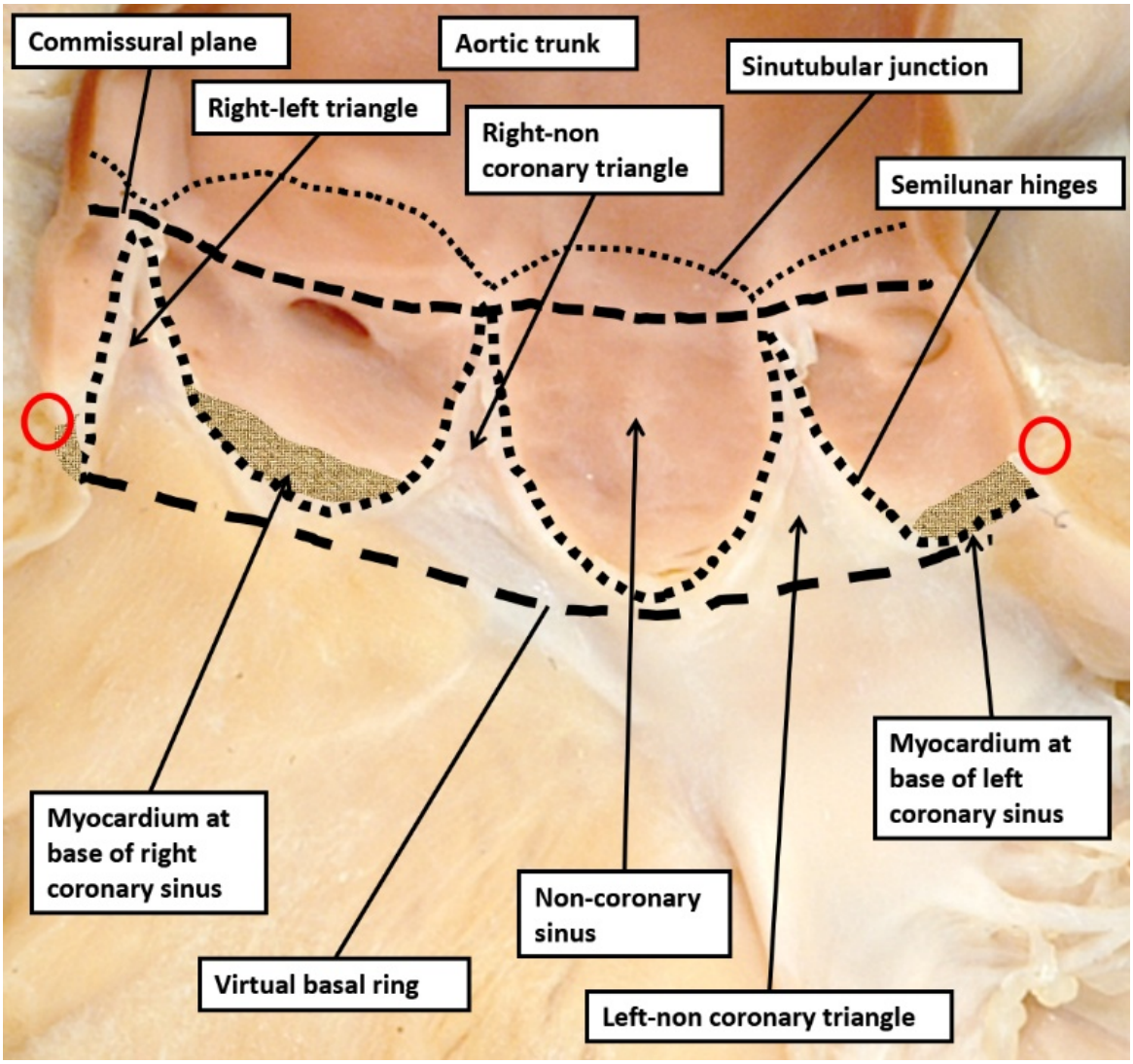
Supplementary Figure 3. The closed aortic valve is photographed from above, showing how the leaflets come together when the valve is in its closed position. The attachments of the adjacent leaflets at the sinotubular junction constitute the valvar commissures. They are the distal ends of the zones of apposition between the leaflets, which extend from the commissures to the centroid of the valvar orifice. The centroid, present only when the valve is closed, is well below the level of the sinotubular junction.



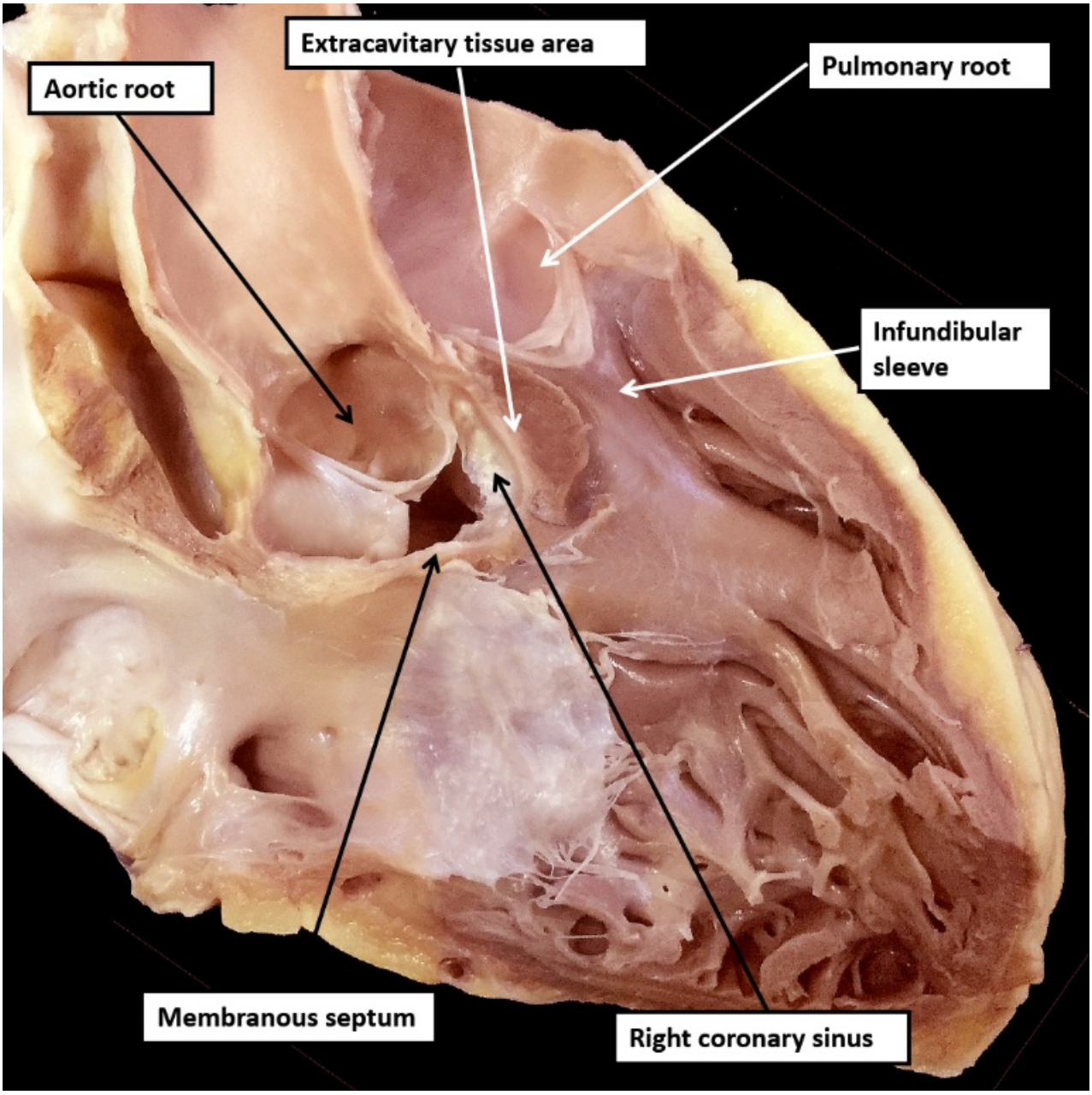
Supplementary Figure 4. The panels show the evolution of the outflow tract myocardium that supports the arterial roots during their development. Panel A shows the arrangement at Carnegie stage 20, when the human embryo has progressed through around seven weeks of development. The myocardium, stained in green, supports both arterial roots. At this stage, it extends distally to reach the level which will become the sinotubular junction. In the pulmonary root, it is possible to recognise the excavation of the outflow cushions and the intercalated valvar swelling that will form the leaflets of the definitive valve. Panel B shows a section through the non-adjacent sinus of the adult pulmonary root. The myocardium has now regressed to a level much closer to the virtual basal ring, leaving myocardium forming the base of the sinus. Remnants of the myocardium that initially extended to the sinotubular junction can still be observed on the epicardial aspect of the distal wall of the valvar sinus.



Supplementary Figure 5. The aortic root has been opened by making a cut through the left coronary aortic sinus, with the root then spread to produce an image comparable to those shown for the pulmonary root in Figure 2 and Supplementary Figure 2. Unlike the arrangement in the pulmonary root, myocardium in the aortic root is found only at the bases of the two sinuses that give rise to the coronary arteries. The two red circles show the level of the myocardial-arterial junction at the site of the incision through the left coronary aortic sinus used to open the root. As in the pulmonary root, it remains possible to recognise the sinotubular junction, with its zeniths marking the tubular plane. The commissural plane, created by joining the attachments of the leaflets at the sinotubular junction, is proximal to the tubular plane. The virtual basal ring is created by joining together the nadirs of the hinges. The leaflets of the aortic valve have been removed in this heart to show the semilunar nature of their hinges. This reveals the presence of the interleaflet fibrous triangles. These fibrous components of the left ventricular outflow tract, separating the walls of the sinuses, extend to the level of the commissural plane.



Supplementary Figure 6. The heart has been dissected to show the relationship between the aortic and pulmonary roots. The leaflets of the pulmonary valve are lifted away from the ventricular base by the free-standing infundibular sleeve. An extracavitary area containing fibroadipose tissue separates the infundibulum of the right ventricle from the sinuses of the aortic root that give rise to the coronary arteries. The membranous septum forms the base of the interleaflet triangle between the right and non-coronary aortic valvar sinuses. The right aortic coronary sinus has been removed by the plane of section.



Supplementary Figure 7. This heart is from a patient with hypertrophic cardiomyopathy. The image has been transilluminated from the left atrium. There is myocardium interposing between the leaflets of the aortic and mitral valve. This feature has previously been described in other patients with hypertrophic cardiomyopathy. Its significance in this setting has yet fully to be established. Its presence does underscore the potential for accessory myocardial pathways to be found across the area that is normally formed by fibrous tissue.