

The stomach is unique in that ICC have a different distribution in proximal and distal regions of the same organ. ICC-CM and ICC-LM are densely distributed throughout the thick circular and longitudinal muscle layers of the cardia, fundus and of the proximal half of the corpus in the mouse, rat and guinea-pig. In contrast, ICC-MP are completely lacking from the space between the circular and longitudinal muscle layers in these regions. ICC-MP emerge in the mid-corpus and become well-developed in the distal region of the corpus with a thin muscle coat, while both ICC-CM and ICC-LM decrease in number in this region.

ICC-MP are particularly dense in the pyloric antrum, though the distribution of ICC-CM and ICC-LM appear similar to those in the distal corpus. Another characteristic feature of the pylorus is the presence of ICC-SM at the submucosal border of the circular muscle layer, despite lack of a nerve plexus in this region corresponding to either the DMP of the small intestine or the SMP of the colon. ICC-SM are observed in a confined area directly adjacent to the pyloric sphincter and are not found in the rest of the stomach in the mouse, rat, guinea-pig, dogs and in the human.

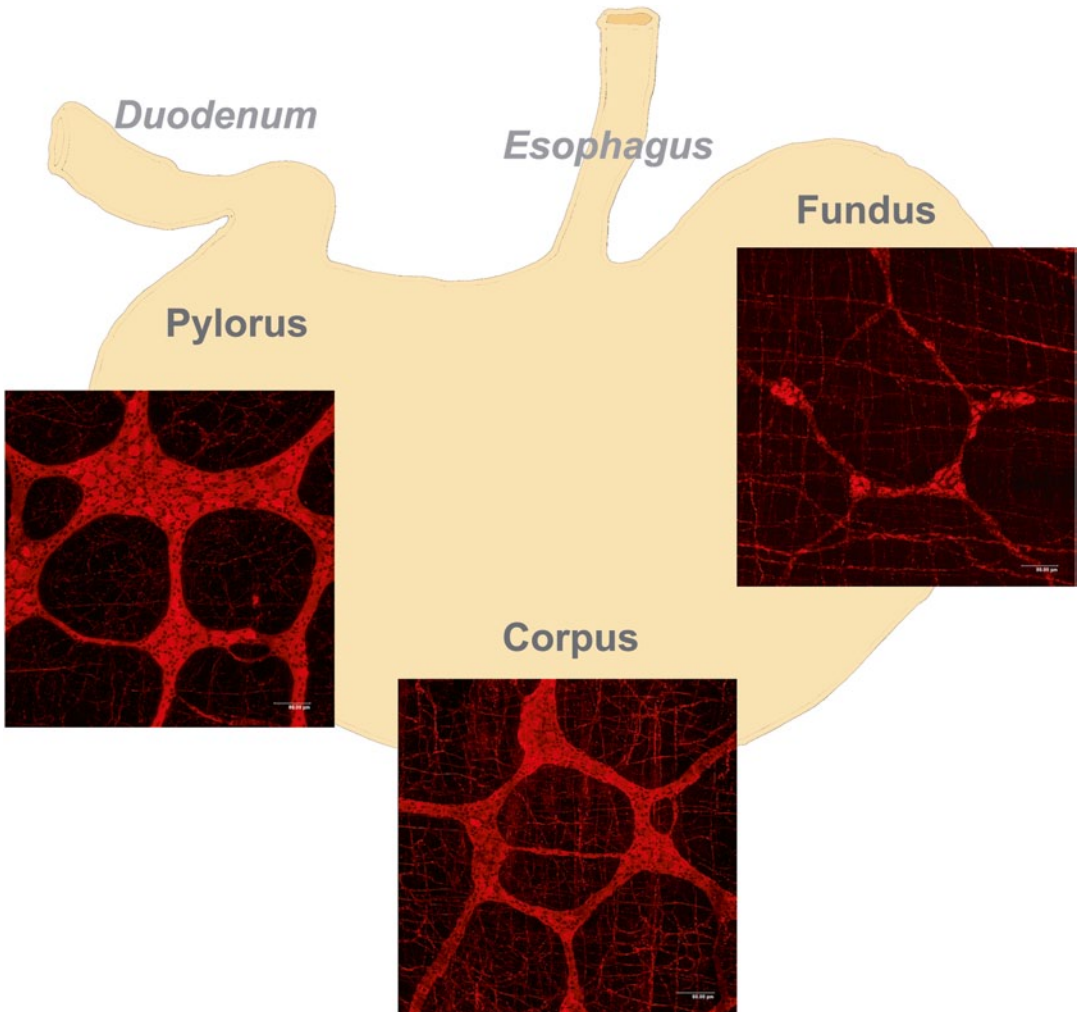


Fig. 2.1 An illustration showing different patterns of the myenteric plexus peculiar to the regions in the guinea-pig stomach stained with PGP9.5 immunohistochemistry Whole-mount stretch preparation of the fundus shows the loose network of the myenteric plexus characterized by small ganglia and thin connecting nerve strands. The corpus shows the myenteric plexus consisting of slightly larger sized ganglia and thicker

connecting nerve strands in comparison of those of the fundus. Fine nerve fibres in both circular (*horizontal direction*) and longitudinal (*perpendicular direction*) muscle layers are also seen. The pyloric antrum shows the myenteric plexus composed of large ganglia and thick nerve strands. (Courtesy of Dr Kunisawa, Waseda University).

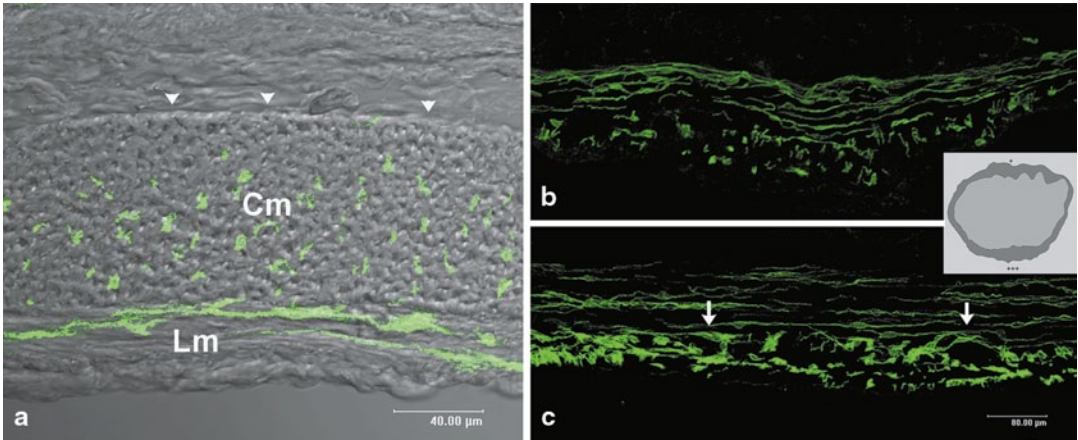


Fig. 2.2 Sectioned profiles of the guinea-pig stomach. **a** A longitudinal section of the corpus observed with Nomarski optics merged with c-Kit immunoreactive ICC (green). Note, green dots (ICC-CM) are mainly located within roughly the basal three quarters of the circular muscle layer (Cm) excluding one quarter from the submucosal surface (arrow heads). This tendency is also observed in the cardia, fundus, corpus and the proximal portion of the antrum. Elongated c-Kit immunoreactive

deposits representing ICC-LM are also seen in the longitudinal muscle layer (Lm). Bar 40 μm . **b, c** Transverse sections of the lesser and greater curvatures of the pyloric antrum of the guinea-pig stomach, respectively. c-Kit immunoreactivity representing ICC-MP is stronger in the greater curvature (bottom) than the lesser curvature (top) (arrows in **c**). Bar 80 μm . (Courtesy of Dr Kuni-sawa, Waseda University).

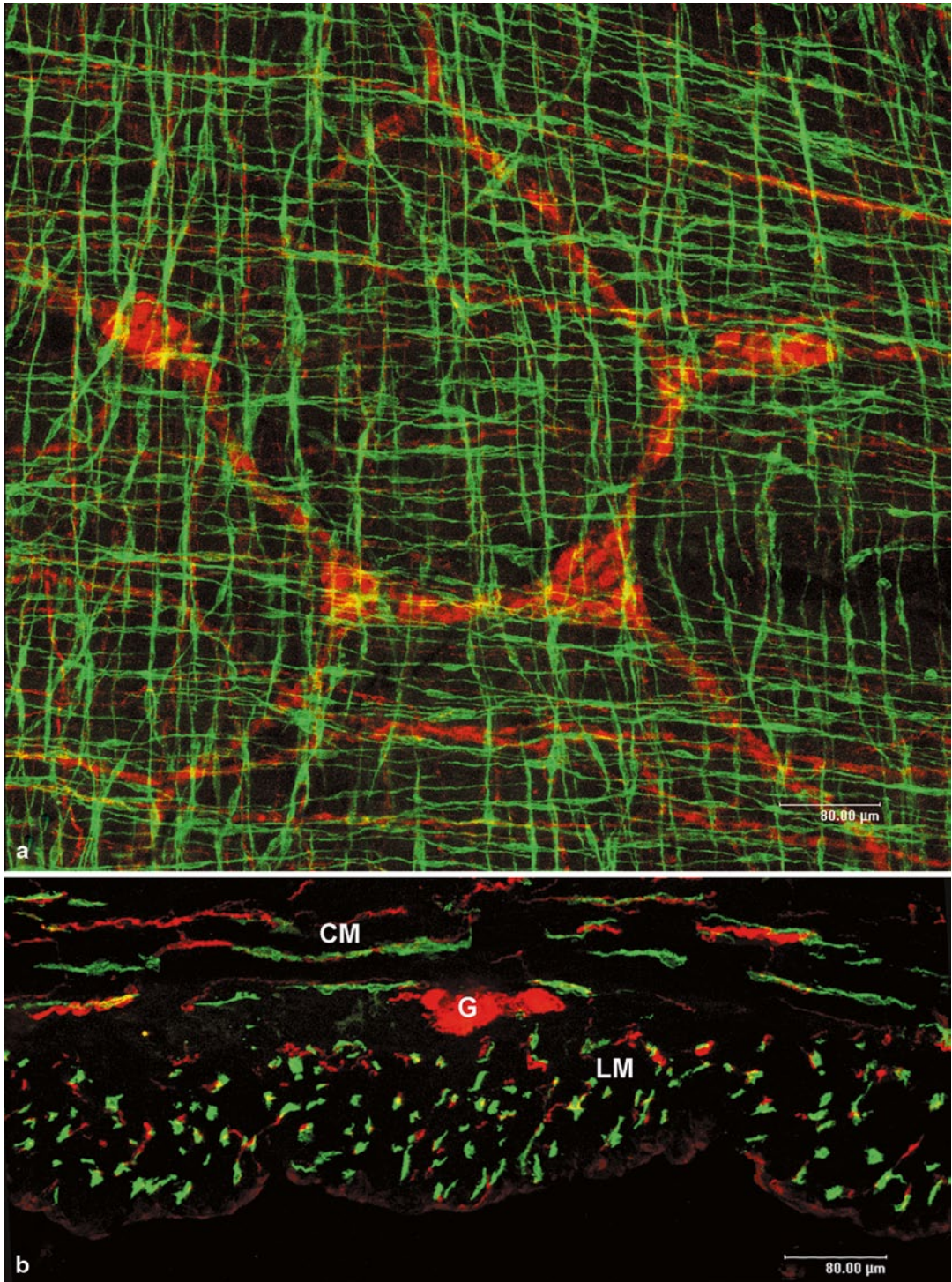


Fig. 2.3 Confocal images of the guinea-pig fundus stained with *c-Kit* (green)/PGP9.5 (red) immunohistochemistry. **a** Whole-mount stretch preparation showing the lattice structures composed of horizontal ICC-CM and perpendicular ICC-LM over the loose network of the myenteric plexus, because of lack of ICC-MP in this region. *Bar* 80 μm. **b** A transverse section of the fundus.

Bipolar shape of ICC-CM (CM) and cross-sectioned dots of ICC-LM (LM) are densely observed within the circular and longitudinal muscle layers, respectively. Between these two layers, however, ICC-MP are not observed around the myenteric ganglion (G). *Bar* 80 μm. (Courtesy of Dr Kunisawa, Waseda University).

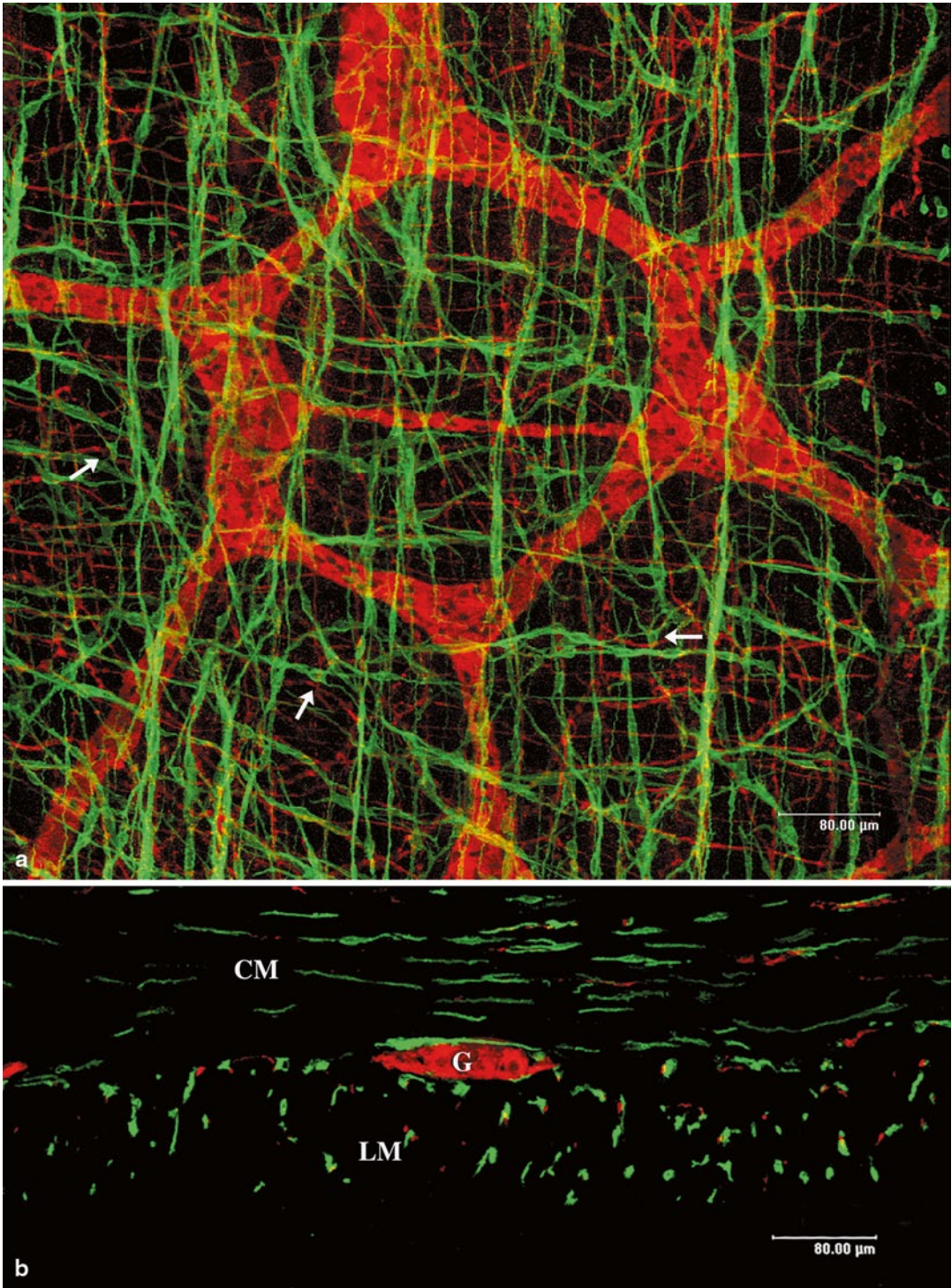


Fig. 2.4 Confocal images of the guinea-pig corpus stained with *c-Kit* (green)/PGP9.5 (red) immunohistochemistry. **a** Whole-mount stretch preparation of corpus showing the lattice structures composed of ICC-CM and ICC-LM similar to those of the fundus, into which, however, are a few regions of intervention by multipolar cells of ICC-MP emerging from the mid portion of the

corpus (arrows). *Bar* 80 μm. **b** A transverse section of the corpus showing a few *c-Kit* immunoreactive deposits representing ICC-MP around the myenteric ganglion (G). ICC-CM (CM) and ICC-LM (LM) are also observed in the circular and longitudinal muscle layers, respectively. *Bar* 80 μm. (Courtesy of Dr Kunisawa, Waseda University).

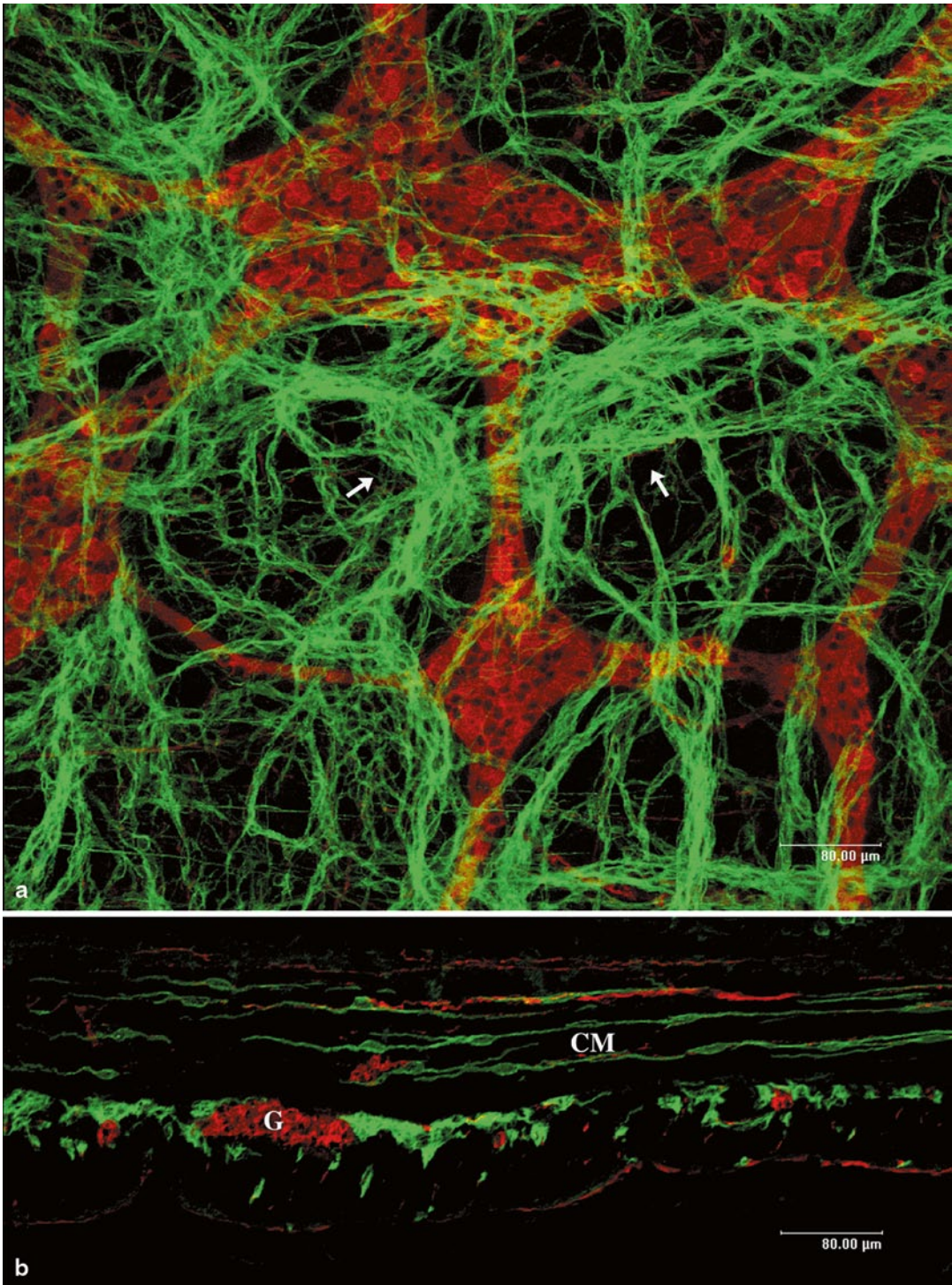


Fig. 2.5 Confocal images of the guinea-pig pyloric antrum stained with c-Kit (green)/PGP9.5 (red) immunohistochemistry. **a** ICC-MP are abundant around the nerve plexus in forms of bundles or in clusters (arrows). They do not make clear basket formations surrounding ganglia as in the small intestine (see below). Bar 80 μ m.

b A transverse section of the pyloric antrum showing strong c-Kit immunoreactive deposits in the myenteric region representing a rich distribution of ICC-MP around the ganglion (G). Bipolar shape of ICC-CM (CM) are also clearly seen in the circular muscle layer. Bar 80 μ m. (Courtesy of Dr Kunisawa, Waseda University).

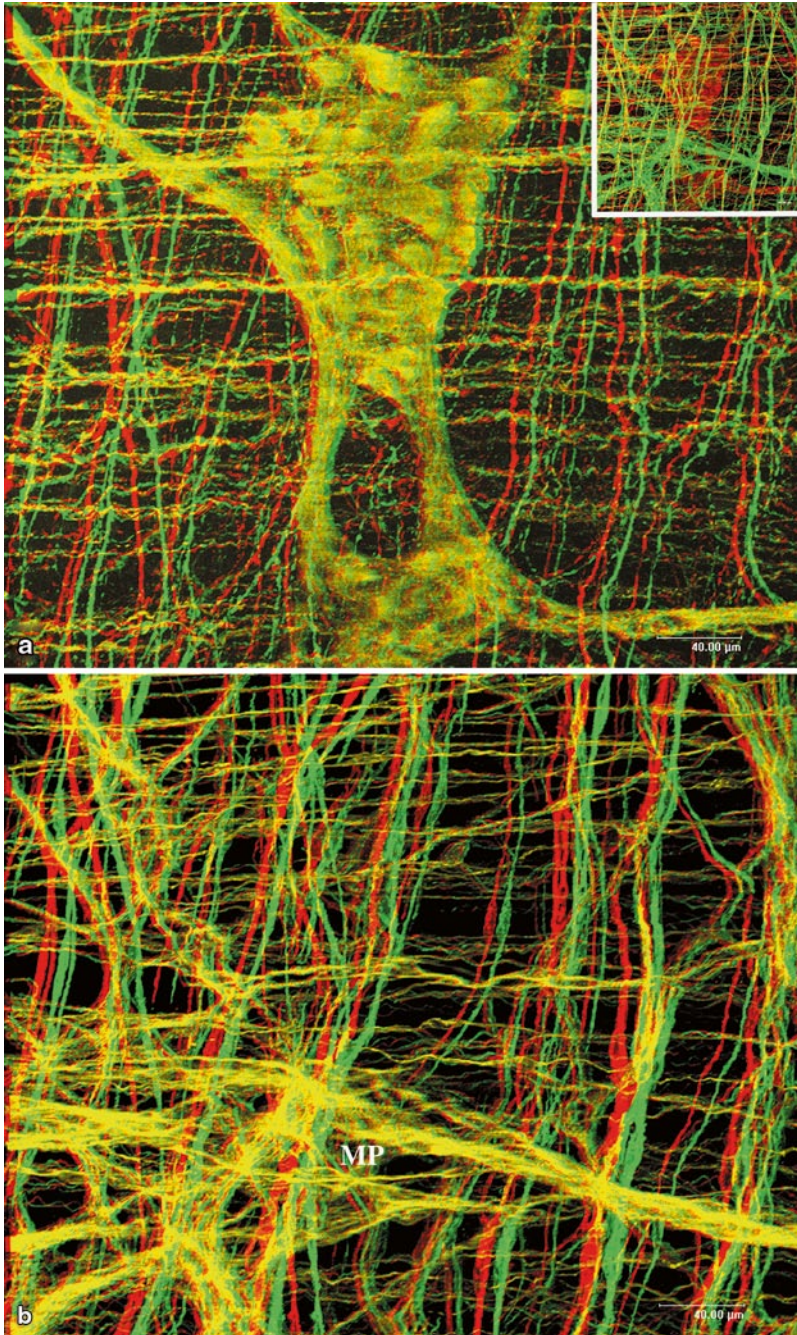


Fig. 2.6 Three-dimensional (3D) reconstruction of the nerve and ICC in the guinea-pig antrum confirming the existence of irregular clusters of ICC-MP. **a** Stereo-micrograph of the nerve plexus in the guinea-pig pyloric antrum, showing the myenteric ganglia sandwiched by nerve fibres in the circular and longitudinal muscle layers, running in horizontal and perpendicular directions, respectively (view with red/green stereoscopic glasses). Bar 40 μm . *Inset* Image merged with **a** and **b** to show spatial relationship of the nerves and ICC. **b** Stereo-

micrograph of ICC associated with the nerves in **a**. Bundles of ICC-MP (*MP*) show uneven distribution around the ganglia. These structures appear to represent their arrangement *in situ* and are not caused by preparation artifact, since they are located between the both circular and longitudinal muscle layers in which nerve fibres show regular arrangement seen in **a** (view with red/green stereoscopic glasses). Bar 40 μm . (Courtesy of Dr Kunisawa, Waseda University).

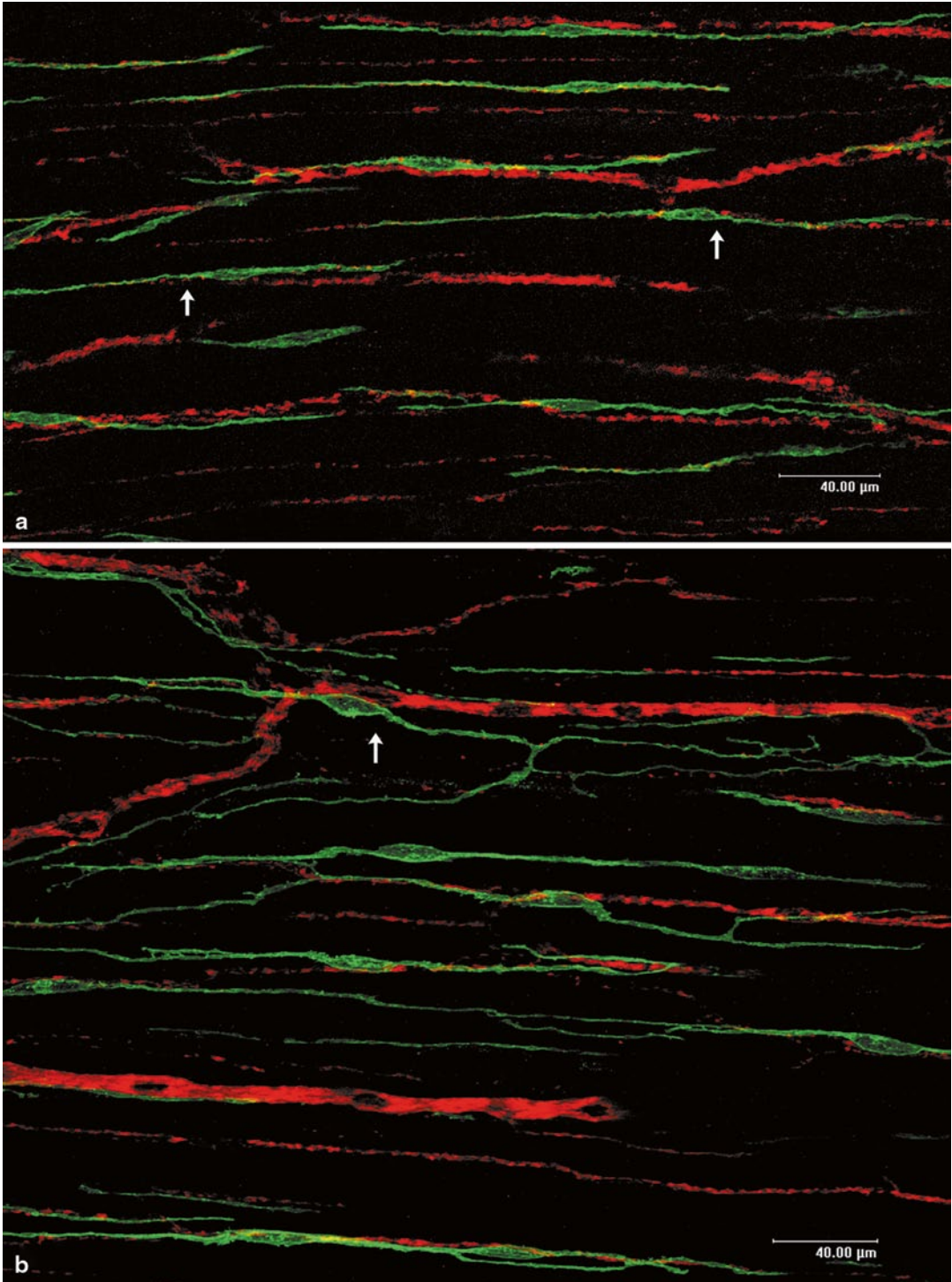


Fig. 2.7 ICC in the circular muscle layer of the guinea-pig stomach. **a** Simple bipolar shape of ICC-CM closely associated with the nerves in the fundus (arrows). Bar 40 μm. **b** ICC-CM (arrow) with branching processes asso-

ciated with the nerves in the pyloric antrum. Note, ICC-CM in this region have long secondary branches. Bar 40 μm. (Courtesy of Dr Kunisawa, Waseda University).

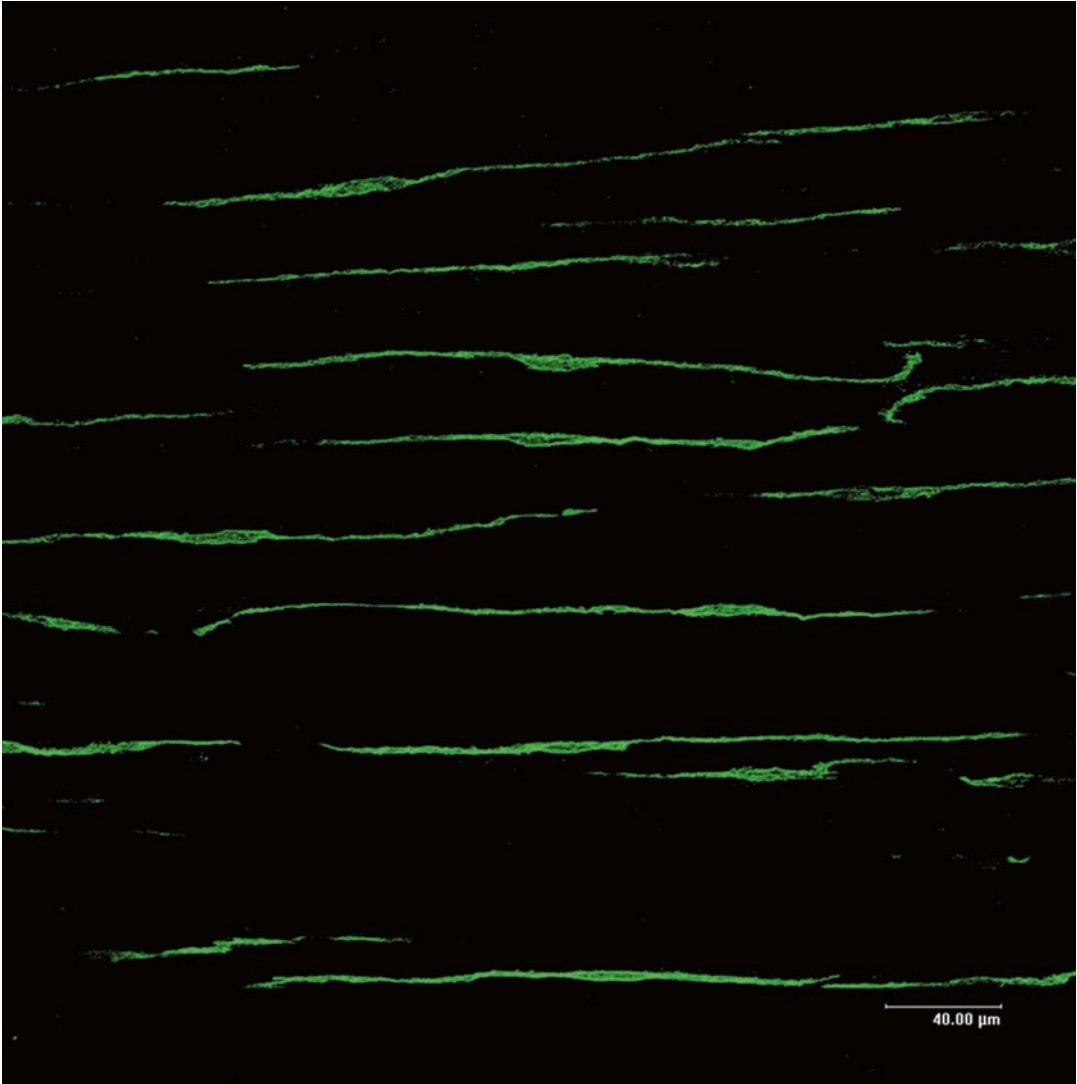


Fig. 2.8 Typical bipolar shape of ICC-CM in the guinea-pig fundus. All ICC-CM in this observation field have a simple bipolar shape and they are rather loosely

arranged with wide gaps. These cells measure 200–240 μm in length. *Bar* 40 μm. (Courtesy of Dr Kunisawa, Waseda University).

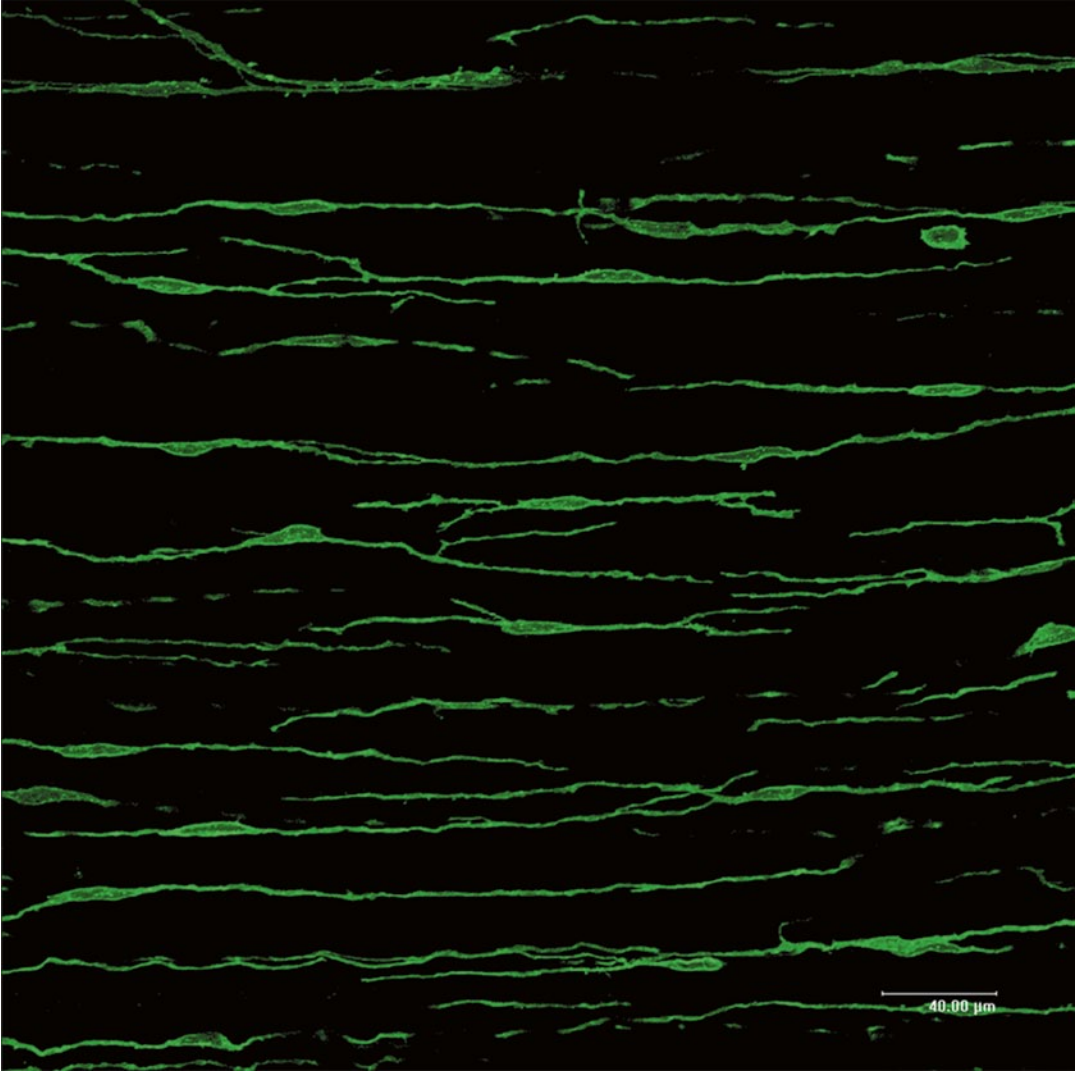


Fig. 2.9 ICC-CM in the guinea-pig corpus. ICC-CM of the corpus show secondary branches and are more closely arranged than the fundus. These cells mea-

sure 250–280 μm in length. *Bar* 40 μm . (Courtesy of Dr Kunisawa, Waseda University).

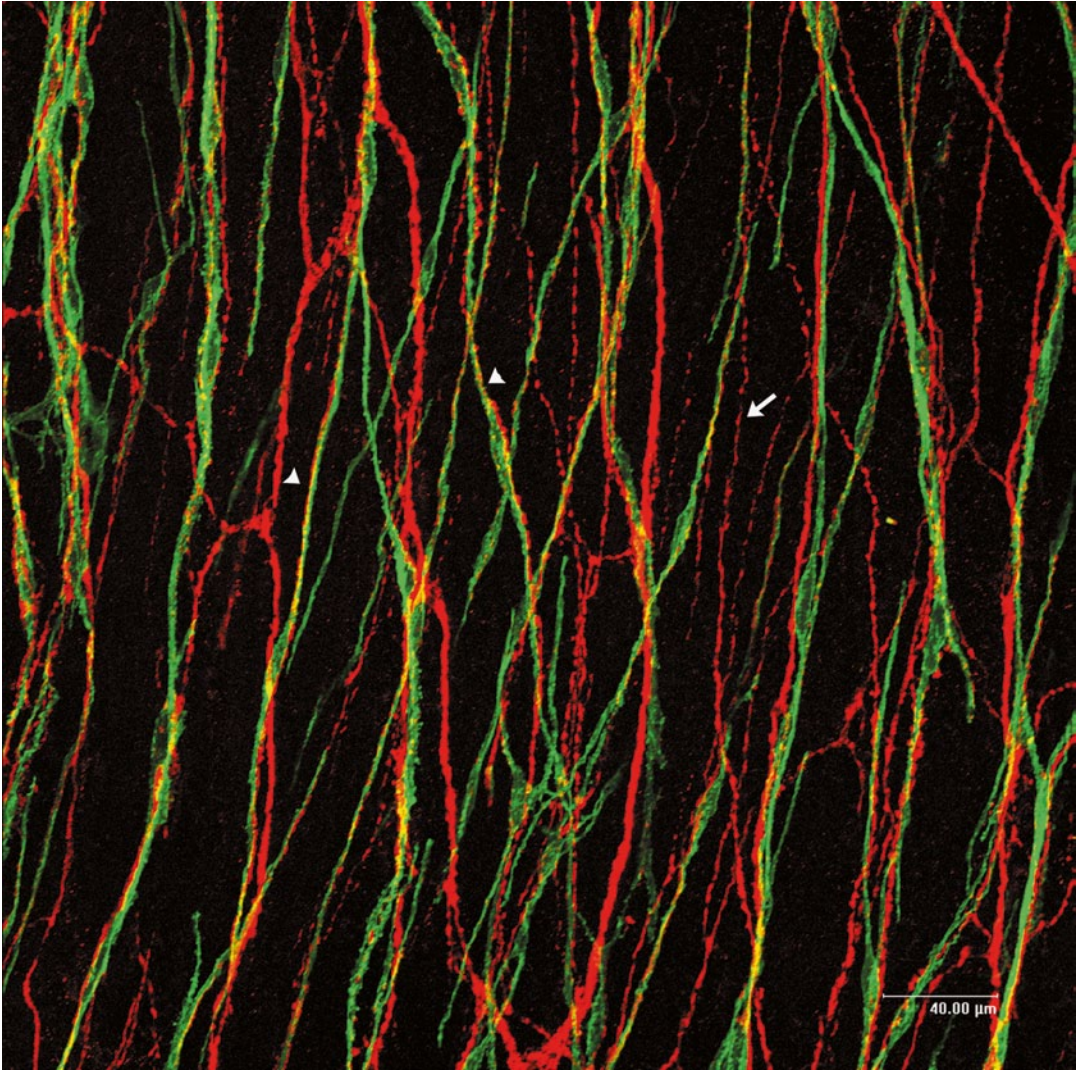


Fig. 2.10 ICC-LM in the guinea-pig antrum. Whole mount stretch preparation of the antrum showing the dense network of nerve fibres in the longitudinal muscle layer, where many nerve fibers show close association with ICC-LM (*arrowheads*) while some fine fibres are

not associated with ICC-LM over long distance (*arrows*), suggesting the presence of direct and indirect innervations. *Bar* 40 μm. (Courtesy of Dr Kunisawa, Waseda University).

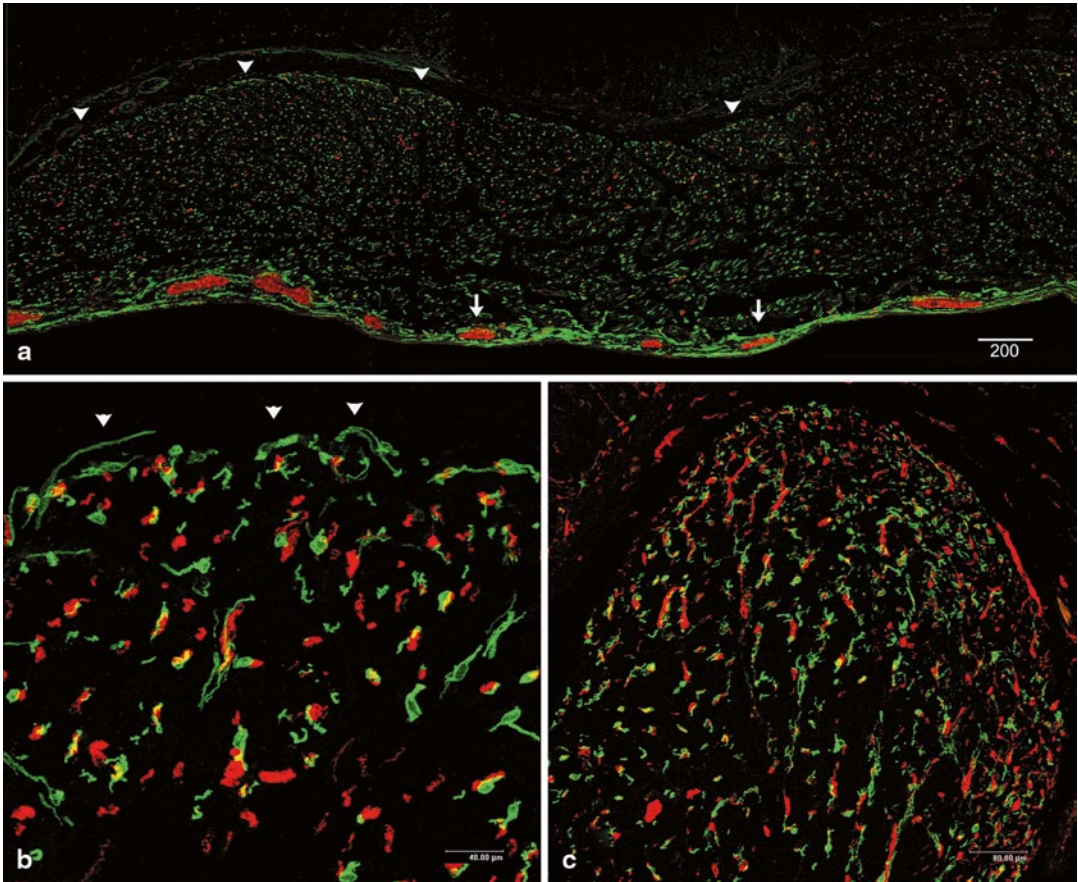


Fig. 2.11 Characteristic distribution of ICC around the guinea-pig pylorus. **a** A transverse section of the region near the pyloric sphincter, where ICC-SM are observed at the mucosal surface of the circular muscle layer (*arrowheads*) within a limited length. Strong c-Kit immunoreactive deposits representing ICC-MP are observed around the myenteric ganglia (*arrows*). Bar 200 μm. **b** Higher magnification of the region similar to the area indicated by arrowheads in **a**. c-Kit positive cells are observed on the submucosal surface of the circular muscle layer (*arrowheads*). Bar 40 μm.

ICC-SM are also observed in mice, rats and dogs. Therefore, ICC-SM probably have some particular significance related to their anatomical position adjacent to the gastro-duodenal junction or tubular structures which differs from the rest of the stomach.

c A transverse section of the pyloric sphincter containing numerous ICC-CM (*green*) in close association with nerves (*red*). Bar 80 μm. (Courtesy of Dr Kunisawa, Waseda University).