swelling conditions. Undoubtedly, when bands are highly enlarged as in Donnan swelling, they will cause considerable rupture of interband structure. The most persistent links within interbands will determine the extent to which the structure can swell or dissolve.

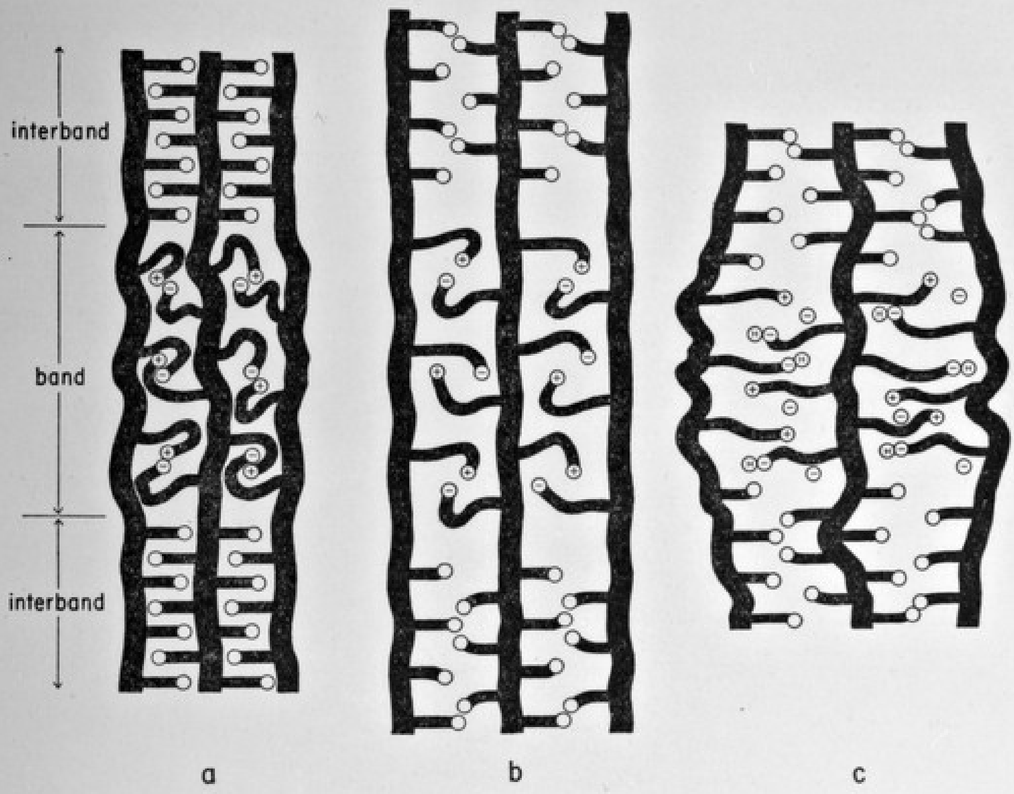

FIG. 32. Diagrammatic representation of the difference between *a*, a dry fibril; *b*, a fibril swelling in water at neutrality; and *c*, the result of acid swelling. Only polar side chains are shown, with open-circled heads representing uncharged side chains, + and − signs designating correspondingly charged heads or ions, and H indicating hydrogen ions. The long charged side chains at bands normally distort the vertical main chain helices from a straight course. Neutral water (not shown) penetrates bands and interbands, separating main chains to an extent limited by hydrogen bonds between polar heads at interbands, and simultaneously more room becomes available for the charged side chains at bands, which now permit straightening of the main chains. Addition of acid discharges the negative side chains by means of hydrogen ions, and the equal number of free negative ions required to remain at the bands produce local osmotic swellings, which contract the structure axially.

While there seems some agreement that salt links are, under aqueous conditions, of relatively minor importance in integrating fibrillar structure, and that hydrogen bonding is effective in determining thermal contraction and dispersion phenomena, there seems to be some disagreement as to the extent of rupture of the latter at various stages in fibrillar