erwähnten zu den Tentakeln sah ich nirgends von dem Nervenstamm des Arms oder der Pinnula abtreten."[1] Thus speaks Ludwig, who has given us a careful description of the ambulacral nerves of *Antedon eschrichti*, the type in which they are more completely differentiated from the ectoderm than in any other Crinoid.

Immediately beneath the closely packed ciliated epithelium which lines the food-groove is the band of nerve-fibrils, which thins away somewhat in the middle line above the radial blood-vessel. It is covered by a very delicate sheet of connective tissue on which the epithelial layer rests, and it is traversed vertically by delicate threads of a similar nature which break up the whole nerve-band into bundles of fibrils with numerous minute cells intercalated among them (Pl. LX. figs. 4, 6, *n*). Ludwig was unable to find this connective tissue sheet in *Antedon rosacea*, and I have not met with it in any other Crinoid but *Antedon eschrichti*. All the other types that I have examined have a much less defined nerve-band than this species (Pl. VIIIa. figs. 4, 5; Pl. LVII. figs. 3, 4; Pl. LIX. figs. 1, 5; Pl. LX. figs. 1, 2—*n*); and the vertical fibres which cross it are continuous with the extended lower ends of some of the epithelial cells in the layer above. In fact, both Ludwig and myself have observed this absence of a basement membrane and the connection of the epithelium with the vertical fibres in some individuals of *Antedon eschrichti*, other sections of which present the appearance described above.

Judging from Hamann's observations on the Asterids and Holothurians,[2] and also from those of Koehler[3] on the Urchins, we may consider it certain that among these "Stutzzellen" there are likewise sense-cells or neuro-epithelial cells, the inferior ends of which are connected with nerve-fibrils.

Not having worked with sufficiently well preserved material, I have never seen them, and they escaped the notice of Ludwig both in Asterids and in Crinoids; but I have no doubt whatever as to their presence.

As regards the cellular elements of the Echinoderm nervous system, it is becoming gradually recognised that nerve-cells of the usual well defined type are either altogether absent, or confined to certain specially sensitive parts of the body. Neither Hamann nor Senon have found anything but bipolar cells in the nervous system of Holothurians. Similar cells have been described and figured by Koehler in the Urchins; while, according to Romanes and Ewart[4] the cell protoplasm "is generally seen to project in two, or sometimes in three directions." The radial nerves of the Asterids, according to Hamann, contain numerous fusiform or bipolar cells, among which are a few with more than two processes; while larger cells, both bipolar and multipolar, occur in the neighbourhood of the terminal tentacle. Considering the reduced condition of the ambulacral nerve in the

[1] Crinoideen, *loc. cit.*, p. 264.

[2] Beiträge zur Histologie der Echinodermen, Mitth. I., II., *Zeitschr. f. wiss. Zool.*, Bd. xxxix. pp. 146, 309.

[3] *Op. cit.*, pp. 50–54, pl. vi. fig. 47.

[4] Observations on the Locomotor System of Echinodermata, *Phil. Trans.*, 1881, p. 836.