SPECIAL ARTICLES.

EPITHELIAL DEGENERATION, REGENERATION AND SECRETION IN THE MID-INTESTINE OF COLLEMBOLA.

IN *Collembola*, a degeneration of the inner half of the epithelial wall of the mid-intestine occurs in connection with each ecdysis. The cells of the mid-intestine become confluent and important changes of alveolation ensue; nearly half the nuclei migrate toward the intima, while the rest of the nuclei remain near the basement membrane; a wall now forms between the two sets of nuclei, dividing the epithelium into two concentric layers. The inner of these two layers degenerates; the cytoplasmic reticulum disintegrates; the nuclear membranes disappear and the chromatin granules become scattered, but remain intact; much of the fluid substance is resorbed into the remaining layer of cells. The disorganized epithelium, surrounded by a peritrophic membrane, is expelled through the rectum shortly after the external moult.

The process is an excretory one. By this means, the rapidly accumulating concretions of sodic urate are removed from the cells of the mid-intestine, as are also, but incidentally, certain unicellular parasites (Gregarinidæ).

The nuclei lost by degeneration are replaced by the mitotic division of the remaining nuclei —this occurring before the inner portion of the epithelium is cast off.

The peritrophic membrane, which always envelopes a food-mass, is formed by the splitting of the intima, and is, therefore, a secretion from the epithelium of the mid-intestine. The wall that divides the originally single layer of cells into two layers, splits into two membranes, one of which surrounds the degenerating epithelium as a peritrophic membrane, while the other forms the new intima of the mid-intestine.

The formation of new cells takes place throughout the epithelium by mitosis; this regeneration does not occur from local centers, or 'crypts,' as it does in other insects; furthermore, no amitotic divisions are found at any time.

Secretion is performed (1) by the general epithelium of the mid-intestine; (2) by special clear cells in the middle region of the mid-intestine; (3) by specialized cells in the posterior region; these last give off proliferations into the lumen, which become constricted off, as free, rounded, cytoplasmic vesicles, which break down in the alimentary canal and mingle their contents with the food (much as in other insects).

The novel rôle of the mid-intestine as an organ of excretion is correlated with the absence of Malpighian tubes in *Collembola*.

JUSTUS W. FOLSOM,
MIRIAM U. WELLES.
ENTOMOLOGICAL LABORATORY,
UNIVERSITY OF ILLINOIS.

EARTHQUAKES RECORDED AT CHELTENHAM MAGNETIC OBSERVATORY JANUARY 24-31, 1906.[1]

1. January 24:

	North-South Component.	East-West Component.
Beginning	2 h. 04 m. 10 s.	2 h. 04 m. 28 s.
Beginning principal portion	2 04 10	2 04 28
End principal portion	2 08 18	2 08 28
End	2 33 56	2 29 48
Maximum amplitude	2.0 mm. at 2 h. 06 m. 32 s.	1.8 mm. at 2 h. 06 m. 08 s.
Average period of waves:		
Maximum	11.0 s.	10.8 s.
End	7.2	8.6

2. January 24:

Beginning	2 h. 42 m. 12 s.	2 h. 42 m. 38 s.
Beginning principal portion	2 43 20	2 43 03
End principal portion	2 46 12	2 45 34
End	2 52 50	2 51 39
Maximum amplitude	1.5 mm. at 2 h. 44 m. 14 s.	2.2 mm. at 2 h. 44 m. 48 s.
Average period of waves:		
Maximum	10.5 s.	12.3 s.
End	7.2	8.6

3. January 24:

Beginning	16 h. 58 m. 50 s.	16 h. 58 m. 20 s.
Beginning principal portion	16 59 20	16 59 20
End principal portion	17 02 50	17 03 30
End	17 10 50	17 08 30
Maximum amplitude	1.0 mm. at 17 h. 01 m. 34 s.	0.6 mm. at 17 h. 00 m. 25 s.
Average period of waves:		
Maximum	11.6 s.	9.2 s.
Beg. prin. portion	9.1	—
End prin. portion	8.8	7.1

[1] Communicated by the superintendent of the Coast and Geodetic Survey, Mr. O. H. Tittmann. The observatory is situated at Cheltenham, Md., in latitude 38° 44'.0 N. and longitude 76° 50'.5 west of Greenwich. The times recorded are