the cells of the duodenal mucosa, which is developing extremely rapidly at this stage.

If we had achieved this result by using deoxyribonucleic acid derived from a mouse tumour we should have been tempted to suppose that the abnormal acid had been assimilated in the genetical material of the mucosal cells in the manner of bacterial transformations. The production of a tumour in this control group indicates the need for extreme caution in interpreting positive results in work of this kind.

T. F. Hewer
E. S. Meek

Department of Pathology,
University of Bristol. Jan. 18.

[1] Benoit, J., Leroy, P., Vendrely, C., and Vendrely, R., *C.R. Acad. Sci., Paris*, **244**, 2321 (1957); **245**, 448 (1957).

## Mast Cells

### Influence of Cobalt on White Mouse Skin Mast Cells

Observations on the action of cobalt compounds on living organisms revealed that this is to some extent similar to that of histamine. Therefore, as mast cells may produce and/or store histamine and histamine-like substances attached to heparin molecules, it was of interest to see if the cells examined were influenced by cobalt compounds. These were given intraperitoneally to white mice in a single dose of 100 mgm. cobalt/kgm. body-weight, in the form of cobalt nitrate, acetate and chloride. Another series of mice received 5 mgm. cobalt/kgm. in the same salts daily for 3 weeks. Specimens of the skin were fixed and stained by a modified Nowak and Zahl stain[1].

Within 1–1½ hr. of receiving a single dose of any of the cobalt compounds an enlargement of the granula and an increase of their metachromasy were observed. The nuclei of the cells were enlarged, and amitotic cell divisions that occurred during full secretion activity of the mast cells were seen frequently, after which the cells were destroyed by clasmatosis. The metachromatic granula then lay in the substantia fundamentalis for more than 5 hr. The separate nuclei underwent pycnosis, and after clasmatosis occurred there was no way of measuring them.

In white mice receiving only 5 mgm. cobalt/kgm. the increased activity observed in the above experiments is much less. After receiving cobalt compounds for 23 days the cells described are found fairly frequently in the specimens, almost all being disrupted, with their granulations often orthochromatically stained. They remain in the proximity of the intact cells forming crown-like structures.

When the same concentration of the cationic components of the cobalt compounds were used the results were similar.

From the experiments described above it follows that cobalt may stimulate the activity of the mast cells, cause their disruption and finally their degeneration. It also stimulates mitosis within the range of doses used and in this way may liberate the substances produced by these cells.

### Diurnal Variations of the Mast Cell Activity

Work over several years has revealed that mast cells secrete heparin and/or histamine[2,3]. We wished to determine whether there are significant morphological variations of the mast cell activity, similar to those described in other organs examined for 24 hr. The observations were made on white mouse skin at 3 hr. intervals for 27 hr. The specimens were stained by a modified Nowak and Zahl method[1]. The kariometric analysis revealed that a definite rhythm exists in the activity of these cells. Detailed data are given in Table 1. The cytoplasmic granula of the cells are most delicate during the morning, at 6 and 9 a.m. The maturity, that is, the extent of metachromatic staining, is also minimal at these times. The metachromasy of cell granula increases towards the night and reaches a maximum at midnight. Clasmatosis during the day is minimal and increases during the night.

Table 1. Mean Diameters of the Nuclei of Skin Mast Cells during 24 hr.

| Hr. | Percentage of nuclei with a diameter ($\mu$) | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | 2·4 | 3·6 | 4·8 | 6·0 | 7·2 | 8·4 | 9·6 | 10·8 | 12·0 |
| 3 | 0 | 4 | 13 | 47 | 21 | 8 | 5 | 2 | 0 |
| 6 | 2 | 10 | 37 | 21 | 16 | 9 | 5 | 0 | 0 |
| 9 | 5 | 11 | 31 | 38 | 10 | 5 | 0 | 0 | 0 |
| 12 | 1 | 7 | 18 | 43 | 21 | 6 | 4 | 0 | 0 |
| 15 | 0 | 2 | 9 | 31 | 39 | 14 | 3 | 2 | 0 |
| 18 | 0 | 1 | 2 | 6 | 22 | 27 | 20 | 17 | 5 |
| 21 | 0 | 0 | 4 | 15 | 31 | 38 | 10 | 2 | 0 |
| 24 | 0 | 0 | 6 | 23 | 36 | 19 | 9 | 7 | 0 |

The results show that mast cells, as probably all cells of living organisms, are influenced by day and night changes. This fact is of interest not only in the examination of the fate of heparin and histamine in the organism, for the diurnal factor must be taken into account as a very significant one in any observations on labrocytes, that is, on mast cells.

Tadeus Niebroj

Dept. of Histology,
Silesian Medical School,
Zabrze, Poland. Jan. 7.

[1] Nowak, D., and Zahl, W., *Stain Technol.*, **24**, 180 (1949).
[2] Riley, J. F., *Science*, **118**, 332 (1953).
[3] Fawcett, W., *J. Exp. Med.*, **100**, 217 (1954).

## A Lipopolysaccharide Antigen of the *Treponema*

Immunochemical studies carried out by D'Alessandro *et al.*[1] on a non-pathogenic, culturable treponeme, the so-called Reiter treponeme, revealed the presence of four antigenic components: (1) a thermolabile protein; (2) a specific, thermostable antigen with polysaccharide characteristics; (3) a lipoid, corresponding to the ubiquitous lipidic antigen cardiolipin; (4) another lipoid similar to the organ-specific cerebral antigen of Witebsky[2]. These studies led to the conclusion that the treponemes, like other organisms, are mosaics of antigens, and a safe basis was established for a better understanding of the complex serological response of the infected host.

In the serodiagnostic field the interest has been focused so far on the Reiter protein antigen, which proved to be a valuable antigen in syphilis serology. The reactivity of the protein antigen, which shows a remarkable specificity and sensitivity, in the complement fixation test with syphilitic serums, is understandable on the assumption that a common antigenic component exists in the Reiter and in the pathogenic *Treponema pallidum*, as indicated by experiments of Dardanoni and Censuales[3].

From the investigations carried out in 1949, the polysaccharide antigen of the Reiter treponeme appeared to be of minor interest from the sero-