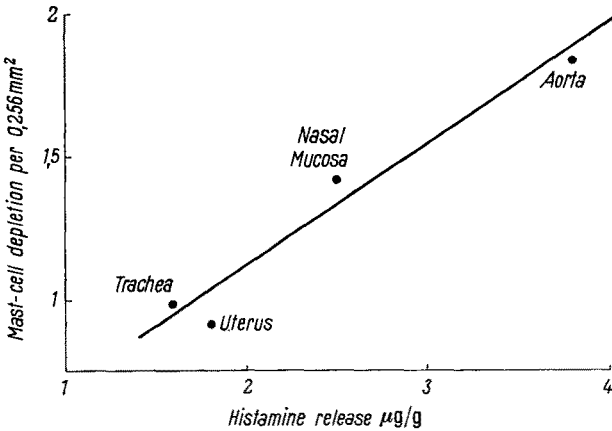


The Histamine Content of Guinea Pig Mast Cells

As reported in an earlier communication, the mast-cell count in different guinea pig tissues shows close correlation to the total histamine content and to anaphylactic histamine release (BORÉUS and CHAKRAVARTY¹). The histamine release was associated with a significant decrease in the mast-cell count. The same method has been used in the present investigation to study (1) the correlation between mast-cell depletion and histamine release following antigen-antibody reaction, and (2) the average histamine content of the individual mast cells in different tissues of the guinea pig.

It was shown in our previous paper that the anaphylactic histamine release from aorta, trachea, and uterus was associated with a mast-cell depletion, the ratio between the two being about the same. The observations were then extended to the nasal mucosa, which has a high mast-cell population (BORÉUS²). In all four tissues the histamine release was correlated to the mast-cell depletion, as shown in the Figure.



Correlation between mast-cell depletion and histamine release in guinea pig tissues following antigen-antibody reaction *in vitro*

The close correlation between the mast-cell count and the histamine content in different tissues suggests that most of the tissue histamine is located in the mast cells. Assuming this, it was possible to calculate the average histamine in each mast-cell from the histamine value and mast-cell count per g of tissue. The weight of the counted sections could be estimated from their area and thickness and specific gravity (taken to be 1). Furthermore, if it is assumed that the released histamine comes from the mast cells, which can no longer be recognized after incubation with antigen and are considered to have 'disappeared', then the amount of histamine released from these cells may be calculated from the histamine release and the difference in mast-cell count in tissues incubated with and without antigen. The values are shown in the Table.

Four different tissues of guinea pig showed from 21 to 34 μg histamine base per mast-cell, and the histamine release from each 'disappeared' mast-cell was from 12 to 17 μg . The slightly lower value for histamine release per cell compared to the values for histamine content per cell could be due to rapid metabolism of a part of the released histamine.

Average histamine content and histamine release from guinea pig mast cells

	Aorta	Trachea	Uterus	Intestine ^a (Jejunum)
Histamine content (μg) of each mast-cell (mean of 4 exper.)	25 \pm 3	21 \pm 1	31 \pm 2	34 \pm 4
Histamine release (μg) from each 'dis- appeared' mast-cell (mean of 2 exper.)	16	12	17	

^a There was no 'disappearance' of mast cells in the case of intestine.

It is of interest to note that mast cells from different tissues have about the same histamine content. Moreover, the values obtained by us in guinea pig tissue are of the same order as those of RILEY³ – 18 and 24 μg – in calf and ox liver capsule. GRAHAM *et al.*⁴ reported 6.7 to 15.6 $\mu\text{g}/\text{cell}$ in different tissues of the dog, and 25.4 and 32.2 $\mu\text{g}/\text{cell}$ in parenchyma and capsule of beef liver. HAEGERMARK *et al.*⁵ have found an average histamine content of 15 to 30 $\mu\text{g}/\text{cell}$ in mast cells isolated from rat peritoneal fluid. It seems from our observations that the histamine content of mast cells is similar in different tissues of the guinea pig. The values are of the same order as those in other species.

L. O. BORÉUS and N. CHAKRAVARTY*

Department of Pharmacology, Karolinska Institutet, Stockholm (Sweden), January 18, 1960.

Zusammenfassung

Von der Voraussetzung ausgehend, dass alles Histamin in den Mastzellen lokalisiert ist, wurde berechnet, dass jede Mastzelle in Aorta, Trachea, Uterus und Jejunum des Meerschweinchens 25–34 μg Histamin-Base enthält. Die anaphylaktische Freisetzung des Histamins war proportional der Verminderung des Mastzellengehaltes und wurde zu 12–17 $\mu\text{g}/\text{Mastzelle}$ berechnet. Jejunum gab keine anaphylaktische Reaktion.

* Present address: Department of Pharmacology, University of Ottawa (Canada).

¹ L. O. BORÉUS and N. CHAKRAVARTY, *Acta physiol. scand.*, in press (1960).

² L. O. BORÉUS, *Acta physiol. scand.*, in press. (1960).

³ J. F. RILEY, *The Mast Cells* (E. & S. Livingstone Ltd. 1959), p. 73.

⁴ H. T. GRAHAM, O. H. LOWRY, N. WAHL, and M. K. PRIEBAT, *J. exp. Med.* 102, 307 (1955).

⁵ Ö. HAEGERMARK, I.-L. THON, and B. UVNÄS, *Personal communication* (1959).