Function of Mast-Cells

SIR,—Both heparin (Jorpes, 1946) and histamine (Riley and West, 1953) are now known to be concentrated in tissue mast-cells, but the physiological function of each still remains uncertain. The release of histamine as a result of damage to the mast-cells might be expected to be accompanied by the release of heparin and a consequent increase in the clotting time of blood. However, this dual release has been observed in only one species, the dog, in which an intravenous injection of peptone or of a chemical histamine liberator such as compound 48/80 may release sufficient heparin to render the blood incoagulable. In contrast, compound 48/80 releases histamine from the mast-cells of the rat but the clotting time of the rat's blood remains unchanged. Where does the released heparin disappear to in the rat?

Some time ago it was found (Riley, Shepherd, West and Stroud, 1955) that the almost complete release of histamine from the subcutis of the rat by compound 48/80 is accompanied by a loss of only half of the associated heparin. At that time, it was suggested that some of the metachromatic material from the disrupted mast cells is diposed of locally by macrophages, some adheres to connective tissue cells and some is bound to the basic histamine-liberator itself. The function of heparin was thought to be concerned rather with events in the tissues than with the coagulability of the circulating blood.

Now, Riley (1962) has shown that both histamine and heparin can and do act primarily on the connective tissues and that they act in sequence, histamine stimulating mesenchymal cells to phagocytose and digest metachromatic material released from nearby mast-cells. The connective tissue cells are thereby stimulated to produce on their own account fresh and specific mucopolysaccharide and contribute in this way to the formation of extracellular ground-substance. Once this has served its purpose, it may, in turn, be broken down, rebuilt, and stored in sulphated form in the granules of tissue mast-cells. Riley has proposed, in this way, a place for histamine in the cycle of the mast-cell. But perhaps of even greater importance is the fact that 5-hydroxytryptamine exerts a more powerful phagocytocic action than does histamine (Northover, 1958) and the former amine is located in, and is released from, some mast-cells in the rat and mouse (Parratt and West, 1957). This may also explain why the recovery rate of mast-cells and tissue histamine is more rapid after treatment with compound 48/80 (which releases histamine and some 5-hydroxytryptamine) than after treatment with polymyxin B (which releases only histamine). Further, low doses of most histamine-liberators have been shown to release as much as 30 per cent of the tissue histamine without affecting the histological appearance of the mast-cells (West, 1956), such tissues then regaining their normal complement of histamine within a short interval of time (about 3 days).

Mention must also be made of the lipaemic-clearing property of heparin since the concentrations required for this effect are at least one-fifth those needed for an anticoagulant action. Here again it appears that heparin is being produced not for its anticoagulant action but for a local more important effect on connective tissue whereby the repair of injured tissue is speeded up. Preliminary studies on wound healing in rats using the method of Boyd and Smith (1959) shows that intense activity in the mesenchyme may be produced locally by injecting a mixture of histamine and heparin but not by histamine alone. Wound healing as measured by tensile strength is stimulated by locally administered heparin which among other things may neutralise the action of local adrenal corticoids.

This evidence supports Riley's hypothesis that the primary action of histamine,

first released when the mast-cell is injured, is to prepare many more connective-tissue cells than are normally available in the reticuloendothelial system to receive the heparin that will follow. Another action of the released histamine may be to cause the appearance in the lymph of an enzyme capable of producing the nonapeptide, bradykinin, from one of the plasma globulins (Edery and Lewis, 1962); this peptide has already been shown to possess a potent vasodilator property, to increase capillary permeability, to cause the accumulation of leucocytes, and to produce pain.

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BOOK REVIEWS

MEDICINAL PLANTS IN NIGERIA. By Bep Oliver. Private Edition. Pp. 138. Nigerian College of Arts, Science and Technology, Ibadan, 1960.

This book is a preliminary review of the more important plant material used in native medicine in Nigeria. The object in view is "to provide a critical study of the scattered information that exists on drugs growing in Nigeria". It is hoped that this study will lead the way to the undertaking of research work to discover the active principles (if any) present in the drugs and to sort out drugs possessing useful medicinal properties from those which are inert. The introduction points out how much mumbo jumbo is associated with many native remedies.

Chapter II gives a tabulated list (Table I) of 94 plants yielding drugs which are, or have been, recognised in European medicine as therapeutic agents. The plants are arranged alphabetically according to their generic names, and particulars are arranged in six columns headed Name of Plant, Family, Part Used, Constituents, Medicinal Use, Other Uses.

For each plant in the Table an indication is given of the publication in which the plant or a product from the plant is or has been described, e.g., B.P., B.P.C., Indian Pharmacopoeia, International Pharmacopoiea, etc.

Chapter III records the "Chemical Constituents of Vegetable Drugs" and Chapter IV lists "Plants Used in Local Medicine" with particulars of their constituents, medicinal uses and a note of any other commercial or possible uses to which they might be put. 362 drugs are included in this list (Table II). Chapter V gives brief botanical descriptions of a selection (247 plants) of Nigerian Medicinal Plants, based largely on Hutchinson and Dalziel's *Flora of West Tropical Africa* and the revision (Vol. I, parts 1 and 2) made by R. W. J. Keay.