THE TERMS LYSOZYME AND LYSOSOME

To the Editor:

The two terms lysozyme and lysosome are being used in increasing frequency in the immunologic literature. These terms have led to inevitable confusion, particularly because lysosomes may contain lysozyme. In the strict biochemical sense, lysozyme is an enzyme which can be classified as a muramidase because it splits a bond between muramic acid and N-acetyl glucosamine. Fleming gave it the name lysozyme because it acted as a lytic enzyme on certain airborne bacteria. Since the lysozyme substrate is so widely represented in the cell walls of bacteria, this enzyme may be highly important in the digestion of bacterial components by phagocytic cells. Many microorganisms are primarily attacked and killed by lysozyme, whereas other microorganisms have in the course of evolution "covered" their lysozyme substrates and are not affected primarily by lysozyme.

Lysosome is a term that was coined by Christian DeDuve, *et al*, to describe a family of subcellular particles in mammalian cells which contains many types of acid hydrolases in isolation from the "cell sap." These particles are characterized by having a "unit membrane" which is sensitive to osmotic shock and membrane-disrupting substances like saponin. Evidence is now accumulating to support the idea that lyso-

somes are not homogeneous in terms of enzyme spectrum and environmental behavior pattern.

The lysosome concept which originally emerged from studies with liver cells quickly found application to polymorphonuclear cells and macrophages. It was in these cells that lysozyme was found localized in particles resembling lysosomes. The exact role of lysosomes in phagocytes is not known, although Hirsch has presented convincing evidence that in the case of polymorphonuclear cells they can fuse with phagocytic vacuoles and discharge their contents of acid hydrolases into the vacuole. In the case of the macrophage, it is not certain whether preformed hydrolases are deployed to the vacuole in this way or whether the functional hydrolases are synthesized *de novo* as a post-phagocytic event. The lack of consistent constitutive levels of hydrolases in macrophages supports the latter possibility. Nevertheless, lysosome-like particles are abundant in highly active macrophages.

The macrophage is an adaptive type cell which apparently can undergo certain forms of functional differentiation as the need arises. It is this cell which is undoubtedly the bulwark of defense against most of our so-called granulomatous infectious diseases and deserves intensive study with respect to its propensity for immunological differentiation. The role of lysozyme and lysosomes during this differentiation remains to be elucidated.

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