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Jones J C. Current concepts concerning insect hemocytes.
Amer. Zool. 2:209-46, 1962.
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A detailed review was given on the origins and types of hemocytes, methods for their study, the functions of the different cells (both demonstrated and proposed but unproved), and the number of cells in circulation during the life cycle among insects. [The *SCI*® indicates that this paper has been cited in over 190 publications since 1962.]

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Before I wrote my general review on the subject of insect hematology, there had been no general agreement about some of the most basic aspects of this difficult subject. There was no uniform nomenclature for the hemocytes, and the ensuing chaos of different names for the same cell and of the same name for very different cells led to much confusion. Further, there was no agreement on how best to study the types and number of cells. A major aim of my review was to promote a more quantitative approach. Yet even today (23 years later), no one has systematically compared the cytology of different hemocytes during the life cycle of a single species in a quantitative, differential study employing the two primary techniques for their study (phase contrast microscopy of fresh and/or fixed wet whole mounts of hemolymph and Romanowsky-stained hemolymph smears). Also, no one has compared numbers of circulating hemocytes in matched sets of unchilled, chilled, and heat-fixed insects. My review offered a clear, uniform method for classifying hemocytes and described the best means for studying them. The review had numerous references. This is probably why it has been so highly cited.

Some of the most exciting studies in hemocytes still need to be done. To give some examples: Would specific hemocytes (e.g., plasmatocytes) in tissue culture enter mitosis and/or differentiate if insect hormones (ecdysone and/or juvenile hormones) were added? Would the hyaline form of the cystocyte with a still-intact nucleus (e.g., from the mealworm) redifferentiate in tissue culture if hormones were added? Certain functions (e.g., coagulation of the hemoplasma) of specific cell types could be more critically studied if they were first isolated in tissue culture with a refrigerated microscope. Using isolation of oenocytoids, spherule cells, and adipohemocytes is essential for analytical biochemical work and might help clarify their largely unknown junctions. Would the discrete masses of hemocyte-like cells around the imaginal wing discs in young lepidopterous larvae (when the cells are all of one type) differentiate in tissue culture media with hormonal boosting and possibly release the cells into the medium? A similar type of experiment could be made by putting the phagocytic organs of crickets into tissue culture to see if they release cells under specific hormonal conditions.

In studies on hemocytopoiesis, critical attention is needed to solve the difficult problem of estimating the *normal* extent of hemocyte degeneration in those insects where rapid lysis may occur as the hemolymph is being sampled.

Gupta[1] has edited a volume on recent advances in insect hematology.

1. **Gupta A P, ed.** *Insect hemocytes: development, forms, functions, and techniques.* Cambridge, England: Cambridge University Press, 1979. 614 p.

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