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The Morphology of Crystallizable Polymers: Past and Present.

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A perspective will be presented of the evolution of current phenomenological knowledge and views regarding the crystallization habits and morphological characteristics of polymers since the early 1950's. By the mid-1950's the characteristically spherulitic crystallization of polymers from the molten state under quiescent conditions was well established. The origins of the orientation of the chains in the constituent radiating fine texture of spherulites preferentially normal to the radial direction remained obscure then. This matter was resolved as a consequence of the seminal studies reported in 1957 independently by P.H. Till Jr. [J. Polym. Sci., <u>26</u>, 301 (1957)]; A. Keller, [Phil. Mag. <u>2</u>, 1171 (1957), and E. W. Fischer [Z. Naturforch., <u>12a</u>, 753 (1957)] on solution-grown polyethylene lamellar single crystals. Chain-folding, as proposed explicitly by Keller, resulting in typically lamellar polymer crystal habits, and the radiating lamellar texture of spherulites became generally accepted very shortly thereafter. Among the aspects which have received much attention in subsequent years are the details of chain-folding, the bulkiness of chain- folds, the nature of order/disorder at the fold surfaces in lamellae, the diversity in the lateral growth habits and 3-D conformations of lamellar crystals (hollow pyramidal, dished or bowl-shaped, scrolled, twisted),and the processes underlying the characteristic evolution of spherulites from transient precursor axialites/hedrites. Some of these aspects will be focused on in this summary which will also touch briefly on some current discussion regarding the nature of the nucleation of crystallization from the molten state, and the nature of the lateral propagation of lamellar growth from the molten state.