sebum, an estimation of the relative efficiency that two vehicles show for delivering a drug into the sebum-rich areas may be made.

The basis for understanding a vehicle's effect on the delivery into sebum-rich areas, such as the hair follicle, appears to be fully explained by conventional solubility properties. Hildebrand solubility coefficients (42) appear adequate to predict this performance. The Hildebrand coefficients for model sebum compositions demonstrate that sebum is an overall nonpolar, oily material (with a Hildebrand coefficient of approximately 7.5–8 $cal^{1/2}/cm^{3/2}$). Many topical vehicle components, such as water, propylene glycol, and ethanol, with Hildebrand coefficients of 23.4, 14.0, and 12.55, respectively, are too polar to be readily soluble in sebum (typically ± 2 units on the Hildebrand coefficient indicates miscible materials). Therefore, for many relatively polar drugs, if the vehicle is not specifically designed to solubilize the sebum reservoir in the hair follicle, there will be little chance to effectively deliver the drug into the deeper portions of the hair follicle. This may be utilized to either avoid delivering a local excess of drug or, perhaps more significantly, to attempt to localize drug delivery into the pilosebaceous unit.

The determination of interactions between skin surface lipids and topical agents involves utilizing various physicochemical techniques. These techniques include contact angles, solubility parameters, and phase behavior determination. Contact angles are used to provide information on the ability of a formulation to wet the skin. These measurements can be done in vivo and in vitro. In vitro studies can use stratum corneum sheets that have been separated from cadaver skin with a trypsin solution. Natural or model skin surface lipids can then be added in known amounts to the stratum corneum sheets. This technique has shown that contact angle measurements can differentiate between relatively polar vehicles that show superior wetting on stratum corneum sheets and less polar vehicles that more effectively wet a sebum film deposited on the stratum corneum (Hatzenbuhler, unpublished results). This work demonstrates that the difference in the polarity of the protein surface of the stratum corneum and the polarity of sebum is sufficiently large to show observably different vehicle performance. Detailed clinical or cosmetic evaluation of this performance difference apparently has not been reported. However, use of solubility parameters in cosmetics formulations was thoroughly described in a recent article by Vaughan (43), in which he lists the solubility parameters for over 150 cosmetic materials.

VII. CONCLUDING REMARKS

As described, the skin and its appendages combine to form a complex, heterogeneous network of epithelial tissue and glands that