theorems and formulae for reference. The book has the usual excellent typography of the Cambridge tracts and is almost free of misprints.

LOWELL SCHOENFELD

Sur les espaces fibrés et les variétés feuilletées. By W. T. Wu and G. Reeb. (Actualités Scientifiques et Industrielles, no. 1183.) Paris, Hermann, 1952. 157 pp.

This monograph consists of the theses of the authors at the University of Strasbourg under the direction of C. Ehresmann, and contains detailed accounts of original contributions of the authors, whose main results have been announced in the Comptes Rendus de l'Académie des Sciences à Paris. The contents of the two papers are not directly related, although both can be said to be concerned with certain aspects of the theory of differentiable manifolds.

The paper of Wu Wen-Tsun has the complete title: *Sur les classes caractéristiques des structures fibrées sphériques.* Its starting-point is the so-called universal bundle theorem. In the cases in which the author is interested, the fiber bundle has as base space a finite polyhedron B and as structural group G one of the three groups: the orthogonal group O_m in m variables, the proper orthogonal group $\hat{O}_m$ in m variables, and the unitary group O'_m in m complex variables. The universal bundle theorem asserts that, B and G being given, there exists a bundle with the base space B_0 and the same structural group G such that the given bundle is induced by a mapping $f:B\rightarrow B_0$ and that this mapping f is defined up to a homotopy. It was perhaps Pontrjagin who first observed that the dual homomorphism $f^*:H(B_0, R)\rightarrow H(B, R)$ of the cohomology ring of B_0 into the cohomology ring of B, relative to a coefficient ring R, is thus completely determined by the bundle. In our three cases we can take as B_0 respectively the following Grassmann manifolds: the manifold $R_{n,m}$ of all m-dimensional linear spaces through a point O in a real Euclidean space of dimension $n+m$, the manifold $\widehat{R}_{n,m}$ of such oriented linear spaces, and the manifold $C_{n,m}$ of all linear spaces of dimension m through a point O in a complex Euclidean space of complex dimension $n+m$, with n sufficiently large in all three cases. The author's notation for $C_{n,m}$ is slightly confusing. In many places, such as on pages 7, 8, 48, etc., it would be clearer to write $C_{n',m'}$ for $C_{n,m}$.

The fruitfulness of this approach is based on the fact that these Grassmann manifolds are relatively "rich" in homology properties. The homology groups of these manifolds were determined by Ehresmann, on adopting the notion of Schubert varieties in algebraic geometry. Since f^* is a multiplicative homomorphism, it suffices to