he had explored the farther reaches of the Old World, much less the coasts of the New."

Because primitive watercraft were made of perishable material, a study of their origin, technology, and dispersal must begin with historic end products. In this study, the author has limited his investigations to watercraft used by the native people on the west coast of South America. Early historic accounts of the six basic types of watercraft employed at the time of European contact are carefully reported and analyzed, and the distribution of each craft is noted. Since reed-bundle floats, dugouts, and log rafts are still used in distinct areas, the author's 14-month trek along the coast from Panama to the Straits of Magellan pays off in clear descriptions of their construction, varieties, and present distribution. Of importance is Edwards' careful analysis of the historic changes that have taken place, some through contact with European vessels.

Among the more interesting items brought to light in this study is the strong evidence that log rafts were equipped with triangular sails at the time of European contact. The use of square sails on log rafts appears to have been a historic introduction, although the origin of the reed-float square sail used on Lake Titicaca remains somewhat in doubt. Historic records of coastal reed floats 20 feet long, with a beam of from 10 to 12 feet, that were capable of carrying horses and cattle when two such craft were lashed together, indicates their capacity for extended voyaging. These may have been firmer than previously suspected because Edwards found that modern south Peruvian reed floats hold up well for as much as a year. Padre Acosta's account of Indians of Ica and Arica claiming to have sailed inflated sealskin floats to islands far to the west reveals the possible seaworthiness of even this flimsy looking craft.

The author's conclusions are cautious and limited to the area involved. As to the broader questions, Edwards draws no conclusions, but succinctly remarks that "these data suggest that we cannot dogmatically restrict our most ancient travelers between continents to shank's mare."

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## Agriculture: Economic Versus Social Aspects

**Farmers, Workers, and Machines: Technological and Social Change in Farm Industries of Arizona** (University of Arizona Press, Tucson, 1965. 339 pp., $7.50) is notable for its subject and its approach. The new and technologically advancing form of agriculture developing in Arizona is its subject. A union of cultural anthropology and agricultural economics through the collaboration of two authors, Harlan Padfield and William E. Martin, is its approach. The authors' intention is to avoid the polarized light produced frequently by extreme fragmentation of approach. "One type of social reality," they say, "will manifest itself through one method of analysis while another type of social reality which tends to emerge through another frame of social organization is obscured, obviated, or lost entirely" (p. 3).

Southwestern agriculture, notably in Arizona, represents a significant deviation from the repeatedly declared national ideal of agriculture conducted by landowning, laboring families. Conspicuous for its large-scale land operation and rapidly advancing technology, it depends on the intermittent services of numerous landless, migratory, disorganized seasonal workers. Economic "efficiency" viewed through the frame of formal management structure, exists side by side with deep social division, inequalities, massed poverty, and recurrent frictions during the annual production cycle. The authors' initial conclusions state this contrast: Arizona agriculture is an instrument "of social change working in the direction of upward occupational mobility," and also "of exploitation of unsophisticated, culturally unassimilated peoples" (p. 289).

It gives one confidence to discover how intimately and at firsthand both authors know Arizona agriculture, its organization, methods, problems, participants, and viewpoints, from management, on one side, to the varied groups of workers, on the other. They study first the organization and economics of the technologies of three industries —citrus, lettuce, and cotton production. They note the strong tendency "to use more capital and less labor" under pressure from the "profit motive" at the "basis of our free enterprise system." They also note that "the social results of this tendency are both good and bad." On the one hand, it brings "inexpensive, abundant food," and on the other hand, it leaves "certain unsophisticated segments of our population" (for example, Mexican-Americans, Anglo-isolates, Negroes, and Indians) caught between the alternatives of "simple, often seasonal labor" and "subsistence existence on welfare" (p. 111).

The authors state that "Arizona agriculture has never depended upon monopolistic institutions." Apparently land and water monopoly was overlooked. The National Reclamation Act of 1902, under which Arizona's waters have been developed, was designed to break land monopoly and to prevent water monopoly. Its purpose was to limit water deliveries to individuals, and so prevent the very structure in agriculture whose divisions and instability the authors have described so well. Its effectiveness has been paralyzed for a half-century by failure to enforce the law.

This book fortunately joins together what so long have been kept apart in most of our thinking—the "agricultural industry" and the "agricultural workers." It illuminates public policy, from current conflict over closing the bracero program to speculation on a prospect that "perhaps governmental management is the only answer to the full utilization of . . . labor resources. . . . We hope not" (p. 297).

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## Botany

**Flora of Japan** (Smithsonian Institution, Washington, D.C., 1965. 1077 pp., $25), by Jisaburo Ohwi, includes treatments of all spontaneous vascular plants known from the country; it is designed primarily as a manual for students and others who require a reference work on the Japanese flora, and it is the only one available in the English language. Although the author adapted this edition from the Japanese version published in Tokyo in 1953, it is really an emended account and not merely a verbatim translation of the original work.

It should be noted that the pteridophytes were not included in the Japanese edition of 1953. Actually, Ohwi