techniques of urban land use planning can help bring about a more efficient and an aesthetically pleasing pattern, with increased emphasis on reservation of parks, nature areas, farm land, and open spaces separating built up portions." Most of the policy homilies like this sound reasonable. They are side comments flowing tangentially from the empirical results, and they may be viewed as calls for more specific policy analysis.

Occasionally, but not often, growing cities have made far-sighted acquisition of land for nearby parks, but these are exceptions. In the usual case, by the time need is recognized, land has become expensive, those who wish to use the land for private purposes exert severe pressure against its use for parks, and few individuals have incentives to press for public support to ensure overall planning of urban growth. Hard thinking will be required to devise policies that are both helpful and realistic, given an environment so resistant to changing our Topsy-like habits of city growth.

We now hear about plans for joint use of open areas for recreation and agriculture. The goal of reducing surplus agricultural production is compatible with increased use of the land for recreation. Even so, recreation has become a recognized purpose of federal resource projects only after much effort. This book implies that recreational and agricultural uses of land will become more competitive by the end of the century. That change will pose new problems in devising land use policies.

With respect to water one of the more serious conflicts brought out is that between sources of pollution and the use of water for recreation. Demands made on water by both uses will increase several fold. Since uses once established tend to be irreversibly set, this advanced attention is helpful. As with recreation, pollution is already a matter for increased federal activity. Efforts toward an integrated approach that attempts to influence use while there is still time should be continued at all governmental levels. But efforts should not be carried on with the assumption that an integrated approach will actually be followed. It is possible but by no means sure that an ideal blueprint of effective action will be followed. The actual resolution of conflicts is likely to involve interplay between the changing technology of pollution control and piece-meal organizational arrangements. Recreation may lose out, except where multiple purpose projects can be devised in which recreation does not impinge very much on other uses. We must be prepared for the possibility that pollution will be abated chiefly only in areas where local population and industrial expansion would otherwise be severely hampered. In some cases the eventual outcome could be so far from the ideal that integrated planning would not be relevant. In the choice between requiring the treatment of waste by individual polluters and relying on community facilities, the latter—the easier policy to devise—may tend to be followed even if it is not indicated by considerations of cost. To make the most of this situation, efforts to further develop technology for community treatment facilities are needed.

These considerations related to predicting adjustments in supply and demand and to analyzing implications of policy processes are suggestive of how the projection results can be utilized. This book will be remembered for having imparted surer feelings about the setting of future resource problems.

G. S. TOLLEY
Department of Agricultural Economics, North Carolina State College

Brain Function

Frontiers in Brain Research. John D. French, Ed. Columbia University Press, New York, 1962. xii + 285 pp. Illus. $9.

At the formal opening ceremonies of the Brain Research Institute at the University of California (Los Angeles), on 14 and 15 October 1961, seven scientists, distinguished for their research in different aspects of brain function, presented papers in which they reviewed research in their respective fields; they emphasized current trends and attempted to look ahead to future problems and to techniques that may further the solution of these problems. These papers plus the opening remarks by J. D. French, in which he summarizes briefly the events leading to the establishment of the institute, and a historical review of the development of other brain research institutes, by H. W. Magoun, make up the contents of *Frontiers in Brain Research.*

W. F. Windle discusses neuroanatomy in relation to the study of brain function. He illustrates with specific examples how neuroanatomical experiments may contribute to the understanding of experimental neurology.

A. F. Fessard considers the many "frontiers" between different disciplines that study the nervous system and cites experiments which are crossing these frontiers.

S. S. Kety reviews the history of neurochemistry and mentions areas of research where the neurochemist is beginning to communicate with his colleagues in other fields, such as neuroanatomy, neurophysiology, pharmacology, and psychophysiology.

P. W. Bailey surveys the contributions, past and potential, of neuropathology, and, as an elder statesman, takes the privilege of commenting critically and caustically about clinical disciplines whose future development depends upon better understanding of the brain but whose members, to date, have been negligent in their research effort.

J. H. Gaddum deals with a subject that is exciting to the scientist interested in central nervous system and to the clinical practitioner, namely, the biochemistry of the nervous system and, as viewed from the clinical standpoint, the effects of drugs on brain function.

G. W. Harris, in a chapter on the development of neuroendocrinology, gives a short historical introduction to his topic and then mentions current experiments on the interaction between the nervous system and the endocrine glands.

In the final chapter, R. Hassler calls attention to the interesting observations that have been made in pathological conditions of the brain of man. He points out how these observations may lead to experimental investigations in lower animals.

A brief review cannot do justice to this book; the specific examples given by the authors and their speculations about future research must be read in full. Each author has covered his topic succinctly, but the discussions are not superficial. This is not a book written for the educated layman; the authors use the technical languages of their disciplines. Any scientist interested in brain function, and especially the scientist carrying on investigations in one of the disciplines which study the brain, will find that *Frontiers of Brain Research* gives him an excellent overall picture of current research on brain structure and function. He will also find many stimulating ideas about future developments—what questions may be asked, what techniques may be used in seeking answers.

WILLIAM D. NEFF
Bolt Beranek and Newman Inc., Cambridge, Massachusetts

Humboldt Biography

Alexander von Humboldt. L. Kellner. Oxford University Press, New York, 1963. viii + 247 pp. Illus. $5.75.

The subject of this biography, Alexander von Humboldt, 1769–1859, explorer, scientist, and confidant of kings, was a complex person whose strength and weakness as a scientist are revealed in his work on terrestrial magnetism, one of his many specialties. The author of this new Humboldt biography, a lecturer in physics at Imperial College, London, makes the sturdy little German a vivid, noble, impressive, and appealing person.

Humboldt was the first persistent student of geographic and other variations in the intensity of terrestrial magnetism, the discoverer of magnetic storms, and the inventor of the geomagnetic terms *isogonics, isoclines*, and *isodynamics*. His friend Gauss, in 1838, published a mathematical model that fitted the regional magnetic variations and seemed to eclipse Humboldt's contributions. However, Humboldt's well-planned precise observations led to several important developments, of which that by Gauss was no doubt the greatest.

Humboldt was the prince of compilers. His culminating publication was *Kosmos, Entwurf einer physischen Weltbeschreibung*, vol. 1 (1845), vol. 2 (1847), vol. 3 (1850), vol. 4 (1858), vol. 5 (1862), and atlas (1861). It includes eloquent summaries of mid-19th century knowledge of astronomy, geography, geology, and geophysics; the atlas is especially valuable.

Humboldt, a notable explorer, spent 5 years (1799–1804) exploring northern South America and Mexico with Bonpland; in these explorations he covered 6000 miles, mostly on foot. He kept diaries, plotted route maps, collected and described plants, recorded plant and animal assemblages, determined rocks and geological structures, made excellent sketches, and carried out hundreds of determinations of latitude, longitude, barometric pressure, and geomagnetic orientation and intensity. He also climbed the Ecuador volcano, Chimborazo, to 19,170 feet, a world-record height for 30 years. Much later, in 1829, under Russian auspices, he visited the Urals and central Asia.

Humboldt, who was born in Berlin and spent approximately his last 30 years there as the king's chamberlain, had sympathized with the French Revolution, and he marched with the people in 1848. He worked with and for poor miners in both hemispheres and used the remnants of his patrimony, beyond the costs of his expensive American explorations and publications, in helping needy persons, including the young Agassiz. His best years, 1804 to 1827, were spent in Paris with liberal-minded French scientists, notably Arago and Gay-Lussac. When he died, a nearly penniless bachelor, Humboldt shocked everyone by leaving his 11,000 books and his other personal possessions to his servant.

Kellner involves the reader in this absorbing story, all the way.

A. O. WOODFORD
Department of Geology, Pomona College

Note

Freshwater Teleost

Teleost embryology can benefit greatly from comparative studies, and this publication, **Stages in the Development of Ictalurus nebulosus** (Syracuse University Press, Syracuse, N.Y., 1962. 8 pp. 16 plates. $4.95), by Philip B. Armstrong, should do much to add yet another species to those that have earned the attention of investigators in this field. The brown bullhead, or horned pout, is a widely distributed freshwater teleost that can be maintained in aquaria. Its eggs are relatively large (about 3.0 mm in diameter) and hatch in about 8 days at room temperature. According to Armstrong, the eggs are readily dechorionated and reasonably hardy under laboratory conditions. The portfolio of illustrations, by Julia Swope Child, which show the normal stages of development, consists of 16 plates printed on lacquered hardboard. The 89 drawings are clearly executed and well reproduced. An accompanying booklet contains diagnostic descriptions of the 53 defined stages and also furnishes suggestions for collecting adults and for raising the eggs in the laboratory.

MORDECAI L. GABRIEL
Biology Department, Brooklyn College

New Books

Mathematics, Physical Sciences, and Engineering

Asphalts and Allied Substances. Their occurrence, modes of production, uses in the arts, and methods of testing. vol. 5, *Methods of Testing: Fabricated Bituminous Products*. Herbert Abraham. Van Nostrand, Princeton, N.J., ed. 6, 1963. 450 pp. Illus. $15.

Copolymers of Alpha-Olefins. A symposium, American Chemical Soc. (Washington, D.C.), March 1962. Herbert N. Friedlander, Ed. Interscience (Wiley), New York, 1962. 95 pp. Illus. Paper.

Encyclopaedic Dictionary of Physics. vol. 7, *Stellar Magnitude to Zwitter Ion*. J. Thewlis, R. C. Glass, D. J. Hughes, and A. R. Meetham, Eds. Pergamon, London; Macmillan, New York, 1962. 876 pp. Illus.

Fundamental Theory of Structures. D. Allan Firmage. Wiley, New York, 1963. 346 pp. Illus. $8.50.

Ionic Solution Theory. Based on cluster expansion methods. vol. 3. Harold L. Friedman. Interscience (Wiley), New York, 1962. 273 pp. Illus. $13.50.

Organic Syntheses. vol. 42. Wiley, New York, 1962. 128 pp. Illus. $4.25.

Polyurethanes. Chemistry and technology. pt. 1, *Chemistry*. J. H. Saunders and K. C. Frisch. Interscience (Wiley), New York, 1962. 384 pp. Illus. $14.

Quantum Theory of Molecules and Solids. vol. 1, *Electronic Structure of Molecules*. John C. Slater. McGraw-Hill, New York, 1963. 501 pp. Illus. $12.50.

Readings in Mathematical Programming. S. Vajda. Wiley, New York, 1962 (reprint). 138 pp. Illus. $4.25.

Subsets of the Plane: Plane Analytic Geometry. Howard E. Taylor and Thomas L. Wade. Wiley, New York, 1962. 105 pp. Illus. Paper, $1.95.

Symbolic Languages in Data Processing. Proceedings of the symposium organized and edited by the International Computation Centre (Rome), March 1962. Gordon and Breach, New York, 1962. 863 pp. Illus. $34.50.

Yearbook of Astronomy, 1963. J. G. Porter and Patrick Moore, Eds. Eyre and Spottiswoode, London, 1962; Norton, New York, 1963. 222 pp. Illus. Paper, $3.50.