

A. Y. best Douglas

Publications

Book Reviews^{32.}
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THE JOURNAL OF THE
ROYAL ASTRONOMICAL
SOCIETY OF CANADA

DEVOTED TO THE ADVANCEMENT OF ASTRONOMY AND ALLIED SCIENCES



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reconcile this book with the claim on its jacket that 'the information in this book is essential for anyone planning a career in astrodynamics'. I am still seeking a text that develops the traditional theory in conjunction with those portions of numerical analysis and computer orientated techniques that are currently in use. However it is refreshing to see in this book the newer uses of Hamilton-Jacobi theory for problems on artificial satellite orbital and attitude motion. The 'blurb' promises a discussion of 'analytical procedures of satellite surveillance', but there are only three pages on this topic in the book.

I am tempted to agree with the author that he has no claim to being a specialist in astrodynamics, but his enthusiasm for satellite attitude dynamics is apparent.

To would-be authors of texts on celestial mechanics I offer the following list of topics: numerical integrations of planetary orbits, Lie series, partial derivatives as used in determination of constants of integration from real observations, relativistic corrections, use of FØRMAC and similar computer languages for the algebraic manipulations and expansions of celestial mechanics, the dynamical theory of the rotational 'lock-in' of Mercury in its orbit, integrations for Apollo missions, the proposed 'grand tours' of the outer planets with energy derived from gravitational perturbations produced by Jupiter and Saturn and a much more comprehensive reference list including some papers from the journal 'Celestial Mechanics'.

J. S. GRIFFITH

* *Journal for the History of Astronomy*, Volume I, Part I, edited by M. A. Hoskin. Pages 94; $6\frac{1}{8} \times 9\frac{1}{4}$ in. London, Macdonald & Co. (Publishers) Ltd., 1970. Price \$7.20 U.S. (2 issues per year).

The proliferation of learned journals in recent years is inevitable when one considers the rapidly increasing number of young scholars entering research fields in almost every country. The appearance of a *Journal for the History of Astronomy* is to be warmly welcomed. It will help to fill a long felt need.

The Editor, M. A. Hoskin, is Lecturer in History of Science at Cambridge University, Fellow and Librarian of Churchill College. The international character of the Journal is seen in the selection of fourteen advisory editors from U.S.S.R., U.S.A., Poland, Japan, Great Britain, Germany, Denmark and Czechoslovakia. The format is excellent and it is well printed on good quality paper.

The Editor's contribution to the first volume is on the 18th century cosmology of Thomas Wright of Durham, his bold speculations, his efforts

to harmonize religious and scientific ideas, and the influence of the Hamburg summary of his work on Emmanuel Kant.

Seven authors contribute six papers to this first number. D. T. Whiteside of Cambridge presents a long paper on the maturing of Newton's thoughts on dynamical astronomy, 1664-84. The author claims 1684 as "the true *annus mirabilis* in which the basic tenets of the *Principia* (1687)—and in consequence of classical dynamics—were first clearly conceived". Forty-five references are given.

E. S. Kennedy and Nazim Faris, both of Beirut, discuss solar eclipse techniques of the 9th century Persian astrologer-astronomer Bizist (whose name after the Islamic conquest became Yahya bin Mansur), with 14th century clarifications by Ibn al-Shatir.

Fifteenth century astronomical treatises, published in Nuremburg, with reference to Bernard Walther's innovations in astronomical observations are examined by Donald de Beaver (Missouri). Stanley L. Jaki (New Jersey) contributes a short paper throwing new light on the degree of indebtedness of Olbers to Chéseaux.

The last paper is a careful analysis by Lloyd S. Swenson (Houston) of the assumptions underlying the Michelson-Morley-Miller experiments, the deductions made therefrom and the limited influence of these on the development of relativity theory. This is a valuable paper reviewing all the major and many minor experiments from 1887 (Michelson) to 1930 (Joos) aimed at proving or disproving aether-drift. Eight "insights" are given in the Conclusion, and 68 references.

Seven books are reviewed and there is a short section called Notices of Books, also an impressive list of the University of London theses and dissertations on History of Astronomy now in progress.

One suggestion to the Editor is that in future each author be required to include a brief summary with his paper. This would be of real value to readers scanning the *Journal*. Everyone interested in the history of science will wish the Editor and his advisors the greatest possible success.

A. VIBERT DOUGLAS

Encyclopedia of Astronomy by Gilbert E. Satterthwaite. Pages x + 537; $6\frac{1}{4} \times 9\frac{1}{4}$ in., Hamlyn Group, Toronto, 1970. Price \$24.95.

For many years there has been a need for a comprehensive encyclopedia of astronomy, in a single volume, strictly alphabetized, and meeting the demands of students, advanced amateur astronomers, and laymen. The volume reviewed here certainly fills this need.

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Silberstein: *The Size of the Universe* — Review by *A. Vibert Douglas*

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"THE SIZE OF THE UNIVERSE"

(By DR. L. SILBERSTEIN, Oxford University Press, 1930)

Review by A. VIBERT DOUGLAS

Those whose privilege it is to know the author of this book will read it with double pleasure—first, because of the substance of the book; and, secondly, because they will see the author himself in almost every page, hear his voice and behold his very gestures and play of expression. So vivid is this impression that it may well be said that the book is no mere impersonal scientific treatise, but a portrait of its gifted, versatile, enthusiastic, and impetuous author.

Should one, whose knowledge of the tensor calculus is insufficient to ensure a critical reading of much of the analytical portion of the book, attempt at all to review its contents? This, perhaps, is an open question. Yet I venture to do this very thing because I am sure that there are many with no more, and perhaps less, ability to handle the "precious tensorial material" with "well-nigh magical efficiency" (page 7) in laying the foundations for the great enterprise of world-building, who, nevertheless, like the writer, can appreciate much, if not all, of the significance of these efforts, and follow with interest the trend of thought of the great modern cosmologists.

After a most admirable and concise survey of tensors, projective space (considerations of the geometry of which elicit the adjectives, "marvellous, rich, and unspeakably beautiful"), Staudtian scale, spacetime, and curvature, the purpose of the book is clearly set forth on page 38:—"Contemplate our spacetime as a four-fold of *constant curvature* (K) It is exactly the purpose of this book to find out whether there are reasons weighty enough to discriminate between $K \geq 0$, and to place the value of the world-curvature between certain numerical limits". This decision, we are told, must rest with mathematician, observing astronomer and experimenting physicist working in collaboration.

Fourteen pages dealing with metrics, curvature (Gaussian and

Riemannian), the conditions for constant curvature and finally Einstein's two "bridges" (the postulates of General Relativity), connecting the abstract world-geometry with physics, bring Part 1 to its conclusion.

Part 2 opens with Einstein's and de Sitter's attempts to find a tensor applicable to "spacetime at large"—the former involving the property of homogeneity without isotropy, the latter ensuring that "precious property" (page 67), namely, isotropy, and hence also homogeneity. Einstein's cosmology is then discussed with considerable detail, emphasis being laid upon certain artificial assumptions and difficulties which lead the author to reject this solution as entirely untenable and in contradiction to the observable properties of the actual world.—"With due respect to the founder of modern Relativity, this superstructure of his masterly theory is entirely indefensible" (page 84). Throughout the chapter, both in the lines and footnotes and between the lines, one can perceive the sharp keen points of the author's rapier-like criticisms and witticisms fairly scintillating in the sunshine of his own enjoyment of his task!

Part 3 is a devastating attack upon Dr. Hubble's conclusions drawn from his examination of 400 of the extra-galactic nebulae and his evaluation therefrom of the average density of space, which, by the aid of Einstein's formulae relating mass, density and radius of curvature of the Universe, leads to a size-estimate of Einstein's polar and antipodal space. Dr. Silberstein criticizes the legitimacy of drawing conclusions regarding 400 galaxies from data known accurately for only six, criticizes the analytical methods employed, criticizes the deductions, and criticizes Hubble's interpretation and application of "that great and valuable principle of Uniformity of Nature"—this last with a vigour and earnestness amounting almost to mystic fervour (page 91). After recording Hubble's estimate of the radius of the Einstein world as 2.7×10^{10} parsecs, equivalent to a mass-total of 9×10^{22} suns, and after quoting Hubble's statement that soon the great telescopes will enable observation of "an appreciable fraction of the Einstein Universe", the knock-out blow is delivered thus (page 99), "Unfortunately, however, and quite apart from the very weak support of Hubble's (density of space)

value, *no part* of Einstein's Universe can ever be observed, since this (cylindrical) Universe, leading to absurd consequences, cannot—in any reasonable sense of the word—be said to exist at all”

In concluding this chapter, an incidental remark is made that is worthy of due contemplation, namely, that while Einstein's relation for the radius of the world makes absolutely no contact with observable, determinable physical qualities, the radius of the electron is no better off in this respect at the present stage of physical theory.

One remark regarding the spirit of these pages seems called for. The cosmologist may be justified in levelling his criticisms at the handling and interpretation of observational material, but on his own admission (page 38), no progress can be made without the collaboration of the observing astronomer. Dr. Hubble's paper, the subject of this chapter, may warrant severe criticism, but there is no excuse for attempting to annihilate completely an astronomer whose contributions to knowledge regarding island galaxies merit the respect and gratitude of astronomers and cosmologists everywhere.

Passing now to Part 4, we find a careful discussion of the physical properties of de Sitter's isotropic spacetime, with the prediction of a shift of the spectral lines of distant stars towards the red end of the spectrum. Here is where the author's personal contribution to cosmological theory makes its appearance. By rejecting de Sitter's assumption that the light source is at rest relatively to the observer, our author develops certain interesting “laws of motion of a free test particle inserted in this spacetime” (page 111 et seq.). The conclusion arrived at is that “a universal scattering tendency is by no means a characteristic feature of the isotropic spacetime although restlessness of free particles is one.” (Page 118.) Developing next the propagation of light or the minimal lines of this spacetime, a minimum parallax is found to exist having the value of the reciprocal of the curvature radius expressed in astronomical units. Following this a “centrifugal tendency is investigated leading to a unit of time named the *cosmic day* whose value depends only on the curvature radius and velocity of light.

Part 5 brings us to the author's main theme—the complete Doppler formula applicable to this isotropic spacetime unrestricted as regards the motion of the star relative to the observer. This formula involves (in addition to expected quantities) the curvature radius of spacetime and “two inexorable *individual* star-constants.”

Intent on obtaining an estimate of the all-important radius, the latter two constants are assumed to have random values and a statistical treatment is adopted which leads to a relation applicable to all available data for both distances and observed radial velocities of distant objects. The information derivable from the globular clusters and Magellanic clouds gives (page 143) $R=3\times 10^7$ parsecs approximately, and a further estimate follows based on 38 spirals in addition to the clusters (4×10^8 parsecs).

Subsequent paragraphs deal with the critical radius of a star or a galaxy, and the criteria for stability which incidentally are not fulfilled in the case of our own galaxy.

Those who are already familiar with Dr. Silberstein's Theory of Relativity (2nd Edn.), will find their chief interest in the present book in the nine Miscellaneous Notes which occupy the last 34 pages. A vigorous and spirited reply is made to certain criticisms of the author's views by Professor Weyl in 1924. In another note the radiant energy traversing inter-stellar and inter-galactic space is taken into account and a modified Doppler formula involving the curvature radius is obtained.

Three further estimates of the curvature radius are made from sets of data not previously utilized:—24 Cepheids yield the value 1.46×10^6 parsecs; 35 O- stars give 1.58×10^6 parsecs; 459 stars from Young and Harper's 1924 memoir lead to a value in very fair accord with the previous two, 1.96×10^6 parsecs. The weighted mean of these is 1.91×10^6 parsecs, and “being based in all upon 518 stars, can be accepted with confidence as the size of the curvature radius of spacetime” (page 211).

This book deserves to be called a cosmological detective story, and few who penetrate any distance into it will lay it aside unfinished. Whether they will feel at the conclusion that the mystery has been fully solved is quite another question. A few of the elect will undoubtedly shake their heads with dissatisfaction, even though

they can themselves offer no alternative solution. Many, however, will acclaim it as a valiant and valuable attempt to solve a great mystery—the true nature of spacetime. But the amateur detectives who hail this as a true solution will do well to take heed of the warning issued by the author himself (page 126), that the significance of a *model* must not be exaggerated. Another great cosmological detective has gone further and warned us to regard all such structures as *maps* not as *models*!

Some astronomers will feel that two million parsecs is a surprisingly small radius and will rebel against accepting it in spite of the high correlations exhibited by the observational material. Quite recently Lemaitre and Eddington have independently carried out investigations which point to the present state of our universe being a transitional one between the Einstein and the de Sitter states. The latter is the ultimate state towards which the whole (physical) creation moves, by a process of expansion accompanied by degradation and dissipation of energy. If this be so, then perhaps it is not to be expected that a relation, applicable to the final state and evaluated by means of observations of the stars during the present intermediate state, will lead to the correct value of the radius at the present time. If the expansion be going on at the rate suggested by Eddington (radius doubling within geological time) the marvel is that any correlations of the kind found by Silberstein should exist at all.

Dr. Silberstein's interpretation of the de Sitter map reveals certain remarkable properties and relationships—what their true significance may be it is impossible to say, but that they have *some* significance can scarcely be doubted.

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W. Douglas

Review

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per unit volume. Special attention is given to some important particular cases and to the virtual work due to the field.

The volume ends with a complete study of all the systems of units used in the application of electricity; and the synoptic table of the dimensions will prove to be of value to all students who are interested in practical investigations.

For reading this work, only elementary notions of infinitesimal calculus are needed, and no preliminary knowledge of vectorial calculus is required.

The subject is considered in a simple, natural, and logical way. By reason of its generality, the book may be regarded as a treatise on electricity.

H. L. VANDERLINDEN

College Physics. By A. WILMER DUFF. New York: Longmans, Green & Co., 1925. 8vo. Pp. xii+484. Figs. 499. Price, \$3.80.

This textbook covers almost the whole field of physics in a clear yet concise manner. The author has endeavored "to simplify and abbreviate the mathematical work without making it less rigorous." The result is interesting. To the student who desires a general knowledge of physics as an auxiliary to his main line of study, this book robs the subject of the much-dreaded mathematical reasoning, replacing such by clear logical statements leading directly to the formulae required. On the other hand, the student aiming toward advanced work in physics would be apt to get a very inadequate conception of what the physicist regards as a rigorous treatment.

Undoubtedly those who teach physics to the first type of student will find this book a very valuable addition. The frontispiece is admirable, showing as it does in diagrammatic form the gradual development of physics since 600 B.C. by the cumulative contributions of the great natural philosophers of twenty-five centuries.

Of the 470 pages, the first 100 are devoted to mechanics. A brief treatment of the properties of liquids and gases follows with a good introduction to wave-motion. Sound is accorded twenty pages. An excellent treatment of heat is given in 75 pages, bringing the reader to the idea of entropy. Electricity and magnetism are carefully covered in about 130 pages, and include a brief discussion of wireless telegraphy, cathode rays, X-rays, radioactivity, and modern atomic theory. The last section is devoted to light, under the usual subdivisions with the addition at relevant points of paragraphs on relativity, crystal analysis, and quantum theory.

The book is well supplied with examples of a simple, direct type and with questions calculated to encourage constructive thought on the part of the student. Many of the illustrations are essentially modern, as, for example, the brief explanation of Flettner's rotor ship following the derivation of Bernoulli's theorem. The desire has been to educate, not merely to teach the facts of physics; thus in treating earth's magnetism reference is made to the expeditions of Amundsen and Shackleton.

Twenty-seven tables of physical constants and properties are inserted in the text, and an Index of Tables is provided. A concise table of logarithms and selected trigonometrical functions is given at the end of an Appendix containing the derivation of a few important formulae.

On page 98 the word "revolve" should replace "rotate" in the enunciation of Kepler's law. On the following page the author attempts a difficult task. We think he would have succeeded better had he headed his paragraph in some such way as "Einstein's Modification of the Law of Gravitation." Is it legitimate to say that he has "explained" gravitation? His law appears to fit the facts of nature more precisely than does Newton's but surely that is as far as we are justified in going. A student starting hopefully from the heading of paragraph 112 may be enlightened as to the method of attack upon the problem but not as to the promised explanation of the phenomenon. We are certain the author could have done better, and even if he had filled another half-page it would have been worth while.

The omission of the name of Sommerfeld in the paragraph on Bohr's theory (p. 437) seems unjustifiable. One could wish that some of the outstanding problems of geophysics had been touched upon. Even the briefest references to such questions as isostasy and earthquake waves help the beginner to realize the ramifications of physics and therefore its fundamental place among the sciences.

But these are minor points; the recent advances in physics are so many that it is a triumph to have embraced so much of the subject in as compact a form as Dr. Duff has succeeded in doing.

A. VIBERT DOUGLAS

THE HARRIS FOUNDATION LECTURES

PROMOTION of a better understanding on the part of American citizens of the other peoples of the world, thus establishing a basis for improved international relations and a more enlightened world-order" is the purpose of the Norman Wait Harris Memorial Foundation. The second series of lectures was given at the University in the summer of 1925 and will be issued in two volumes:

ORIENTAL INTERPRETATIONS OF THE FAR-EASTERN PROBLEM.
By COUNT MICHIMASA SOYESHIMA, and DR. P. W. KUO. \$2.00, *postpaid* \$2.10.

COUNT Soyeshima, who is a member of the House of Peers of Japan and a leading exponent of Japanese foreign policy, contributed three notable lectures: "The Political, Economic, and Social Aspects of Modern Japan"; "Japan's Policy in the Far East"; and "Japan's Relations with the United States."

Dr. Kuo's lectures are on the same subjects as they apply to China. Dr. Kuo is President of Southeastern University, Nanking, China, and one of the best-known educators in that country.

OCCIDENTAL INTERPRETATIONS OF THE FAR-EASTERN PROBLEM. By H. G. W. WOODHEAD, C.B.E.; H. K. NORTON, and JULEAN ARNOLD. \$2.00, *postpaid* \$2.10.

CHINA'S Finances," "Extraterritoriality in China," and "Domestic Politics in China" are Mr. Woodhead's subjects. He is editor of the *Pekin and Tientsin Times* and of the *China Year Book*, an Englishman of twenty years' residence in China.

Mr. Norton, business man, publicist, author, contributes one chapter on the Russians in the Far East; and Mr. Arnold, American Consul in China, discusses her economic resources.

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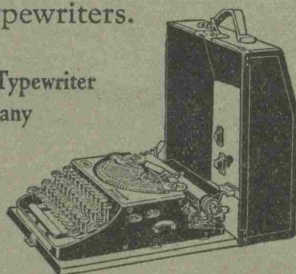
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This is a completely revised edition which brings the discussion entirely up to date, including, for example, even the Compton effect.

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tried to analyze in 1845. She wrote much, but her personal range and influence brought her more distinction than her rather prolix essays and her indifferent verse. "I am not so fastidious as some persons about the dress of a thought." She was a friend of the Channings, Emerson, Alcott, Hawthorne, Thoreau, Clarke, Shaw, Story, Greeley and other notable Americans. She edited *The Dial* (organ of the Transcendentalists), watched the Brook Farm experiment, and served as literary critic of the *New York Tribune*. Three years before her death she married the Marchese Giovanni Angelo Ossoli and through him formed friendships with Mazzini and other Italian liberals.

Mr. Wade's well edited compilation begins with Margaret Fuller's first original book, *Summer on the Lakes*, based on a journal she kept during her visit to the then remote West, with Freeman Clarke and his sister Sarah as her companions. The style is clear enough but lacks charm. It strives anxiously after the grace that eludes it, and disappoints the modern reader by its diffuseness and sentimentality. Her best-known work, *Woman in the Nineteenth Century*—expanded from an article in *The Dial*—although its style also sprawls, has the interest attaching to any earnest proposal for social reform. It is intelligent and persuasive, but the writer "drops into poetry" with a rather disconcerting frequency. Among the critical essays reproduced those of most worth relate to Goethe, Carlyle, Emerson and Poe. The essay, *Modern British Poets*, is not unfair to Campbell; overpraises Scott; treats Shelley, Byron and Coleridge superficially; and responds with some enthusiasm to Wordsworth. *American Literature* is naturally partial to Emerson and W. E. Channing but cold towards Longfellow, severe to Lowell, and somewhat uncertain as regards Hawthorne and Charles Brockden Brown. Part IV contains extracts from the Italian letters, especially those portions relating to the Roman Revolution. These are wiser, more vital writings—though she is still a victim of her style—for she has now found a mate, a spiritual home and a great cause and she was "a woman who could not exist without a cause to cherish". In Part V twenty-five letters (1819-1850) to various important people are reprinted.

Mr. Wade's volume is justly representative of Margaret Fuller's quality, and makes much of her work conveniently accessible. She has been dealt with by not a few other commentators, including our own Sir Andrew Macphail, in his *Essays in Puritanism*.

G. H. C.

THE CONFESSION OF AN OCTOGENARIAN. By L. P. Jacks.
George Allen and Unwin. 1942. \$4.50.

This is not a book to read hastily. It is one to be enjoyed at leisure, letting one's own mind wander freely back and forth along the many avenues of thought traversed or suggested in these pages. L. P. Jacks has been a buccaneer among ideas, says Ernest Barker. In all truth he is a highbrow in the sense in which Virginia Woolf used the expression, namely to describe one who "rides his mind at a gallop across country in pursuit of ideas".

The reader re-lives with the author childhood and student and early professional days, feeling afresh with him the impact of new ideas, the thrill of new vistas of thought, the influence of preacher and teacher, the trial and tribulation of error and misjudgment, the encouragement of success, the optimism of crusading zeal, and the sobering effect of deeper realization of the complexity of the problems of humanity.

Dr. Jacks early felt and has never lost "an underlying sense of the tragedy of life". Nor have the years dimmed his belief in "a Power-not-ourselves that makes for righteousness", rather has that grown into a keystone in the portal to his philosophy; a Power, not ourselves but *within* us, making for righteousness and for completeness. Hence his campaign on behalf of education of the Whole Man, his belief that religion is primarily "the spontaneous response of the *whole* man to the *whole* of his experience", his dislike of dogma, his encouragement of the study of Eastern thought in the Western world, his ardent discipleship of Bergson, his vision of Democracy as a "Society of Friends".

In these pages we meet James Martineau, Spurgeon, and Stopford Brooke, (for whom he coins the beautiful description "the dynamic radiance of his personality"); Norton and Royce of Harvard; Rabindranath Tagore; W. E. Gladstone, Joseph Chamberlain, and Keir Hardie; Lady Wemyss, A. J. Balfour and James Barrie; men of thought and of action, men of the colleges, the churches, the chapels, the business world, and of the simple countryside.

Chapters of outstanding interest are "I Overshoot the Mark", "The Liverpool Controversy", "Editing *The Hibbert Journal*", "My Discovery of the New Testament" and an earlier chapter "Revelations in America".

Perhaps the secret to the greatness of L. P. Jacks' life and influence is found in his fly-leaf quotation from the Psalmist—By my God have I leaped over a wall. Impetuously and with singleness of purpose has he run his race and taken the hurdles, and whenever he has cast a glance over his shoulder he has been very conscious of a Divinity shaping his ends and leading him to his greatest discovery—the intrinsic worth, the potential greatness, and the Messianic mission of the Common Man A. V. D.

The New Books

Canada and International Aid

INTERNATIONAL AID: A SUMMARY.
By H. L. Keenleyside. Toronto: McClelland & Stewart, 1966. Pp. x + 330.

A SAMARITAN STATE?—EXTERNAL AID IN CANADA'S FOREIGN POLICY.
By K. Spicer. Toronto: University of Toronto Press, 1966. Pp. xiv + 272.

In 1949 Dr. Hugh Keenleyside became involved in United Nations missions which led to his appointment as the first Director-General of Technical Assistance Administration. During his tenure of this office, some 8000 experts were sent to over 140 countries. His appraisal of the difficulties and immense complexities of the task, the achievements, the urgency of the world problems of need, and the prospects for the future deserves study and consideration.

He uses the term under-developed countries as a realistic description of countries which are socially static and economically stagnant in contrast to a 'developed' society which is dynamic with its economic and social growth both self-sustaining and closely integrated. His discussion of the population growth problems is able and frank. The failure of increasing food production to keep up with population increase is underlined and the growing gulf between the high standards of living of the few and the low standards of the many is starkly indicated. Prestige enterprises and especially spectacular defense investments are deplored when these same nations cannot yet educate all their children. He admonishes under-developed countries to follow the lead of Japan in the latter part of the nineteenth century "in making a firm national resolution to accept whatever sacrifices are necessary to modernize their way of life" and he warns that "no matter how generous are today's offers of aid through the United Nations or from the varied programmes of individual countries, they will produce little effect unless they are employed in the context of a grim determination to achieve the goals that they may help to make possible." Elsewhere he

cautions against the introduction of automation where a large body of unskilled, uneducated labour exists.

The author has a strong sense of history. He is careful to provide the long-view historic background for his discussions of human progress and lack of progress, and for the review of international aid from the beginnings of Specialized Agencies under the League of Nations to the new obligations imposed by the United Nations Charter. In 40 pages the programmes of the Agencies are reviewed — Technical Assistance, FAO, WHO and UNESCO accounting for 21%, 24%, 17% and 15% respectively of the total programme costs of the United Nations over the period 1950-63. Technical Assistance administration is examined in 46 pages and the remaining 82 pages are devoted to present programmes, future needs and the prospects for the future. "The penalty of failure will be the sacrifice of hope for the future of mankind. The problem is one of morality." That is Dr. Keenleyside's personal view. He gives also the opinion that "the governments of the world have recognized, in words at least, the fact of their interdependence and the responsibility of the more fortunate countries, *primarily in their own continuing interest*, to aid those who cannot solve their problems by their own efforts alone." (Italics are mine.)

Keith Spicer's book deals entirely with Canada's attitude to and involvement in international aid. The book is the outcome of research for a doctoral thesis. Its author plays down the mutual benefits of aid expressed in the italicized words above quoted. He is dubious that aid "blesseth him who gives," and in certain specific cases he is dubious that in the long-term picture it blesseth "him who takes." He thinks there is too much idealism in the public mind and too much short-sighted expediency on the part of the government. He quotes Mr. Pearson in 1955: "In order to test our own motives, we should ask ourselves from time to time whether we would be doing what we are if the political and military menace of Soviet and Chinese

communism did not exist;" and in 1950 Mr. Diefenbaker: "50 million dollars a year would be cheap insurance for Canada. . . ." In 1956 Mr. Donald Fleming hoped "that our principal reason and motive is humanitarian, nevertheless we have to bear in mind the strategic nature. . . ."

Spicer deplors the lack of integration in planning of policy with political aims, economic factors, trade and commerce, and external aid all considered as interacting upon one another "Foreign aid . . . is neither sacred nor even, in some cases, sensible: giving a recipient millions in aid while depriving it of tens of millions in potential exports . . . displays an *a priori* absence of both altruism and logic." He pleads for close co-ordination of aid with "all other instruments of Canadian intervention abroad."

Informative sections deal with the problems of recruitment of 'career service' personnel, experts for overseas projects, and trainees and students to be brought to Canada. He is dubious about launching out into South American aid with a consequent possible restriction of aid to Commonwealth countries, both English and French speaking. He urges the need of regional offices to decentralize the growing work of the External Aid Office in Ottawa. The number of Canadians serving abroad increased from 48 in June 1960 to 418 in May 1965. Over much the same period the numbers of overseas trainees rose from 323 to 1242, including academic scholars. Dr. Spicer deplors the lack of systematic follow-up of these men and women after their return to their own countries.

This reviewer realizes the importance of this criticism after experiencing the warm welcome given by five former Commonwealth fellows when called upon in Kenya and Uganda in 1964, and hearing their spontaneous expressions of appreciation and gratitude to Canada. Each one held a responsible post in education or government and attributed his success to his Canadian training.

Valuable chapters review Canada's co-operation with the World Bank and the Inter American Development Bank; our efforts in capital projects for power and irrigation, communications and transport, natural resources surveys, industry, health and education; our aid through commodi-

ties (food, newsprint, fertilizer, metals, etc.); our financial aid and technical assistance.

Both these books are timely and challenging, and imbued with a sense of intense urgency.

A. VIBERT DOUGLAS

KINGSTON, ONTARIO.

Canadian Letters

CONVERGENCE: ESSAYS FROM QUEBEC. By Jean LeMoyné. Translated by Philip Stratford. Toronto: Ryerson, 1966. Pp. xii + 256. \$4.00.

WHIRLPOOL. By Diane Giguère. Translated by Charles Fullman. Toronto: McClelland & Stewart, 1966. Pp. 78. \$4.50-cl. \$2.50-paper.

Unfortunately, a certain group of my fellow French-speaking Canadians are attracted to pseudo-philosophy, in a naive and snobbish way, so I was not too surprised at the success of *Convergence* when it appeared in French. But that this book should have been translated into English for the English-speaking public to digest is more than I can stomach. It is certainly not fair play. No one should be asked to wade through this mass of unending truisms disguised in the most pretentious language. A better title for Le Moyné's book would have been "*Much ado about nothing.*"

Every type of inanity is found in *Convergence*, from the statement: "I must confess that I no longer believe that we can give an account of ourselves in French" to the erroneous description of Theilhard de Chardin as a master of thinking. Le Moyné thinks "out of tune" as others sing "out of tune."

But I return to the author's statement that French Canadians are incapable of expressing themselves. Since when have difficult or unfavourable surroundings erected barriers to those who have something worthwhile to say and who know how to say it? I admit that Le Moyné does not fit into this category. But let him then read the novels of others such as Panneton, Gabrielle Roy, the short stories of Louis Fréchette, the essays of Fournier and Barbeau, or the poems of Nelligan, Rina Lasnier, Louis Dantin, et al.

happiest, it seems, when relating the family histories of MacFarlanes, MacNabs, MacGregors, Colquhouns and other immortals, chatting about their ancient clan foundations and describing the bloody affrays in which they were once excitedly engaged. The interest of her story is sometimes cluttered with catalogues of sept and other genealogical details of the kind that Lowland shopkeepers use to persuade tenth-generation Americans to buy kilts for their horrified grandsons. Such paraphernalia could have been relegated to an appendix.

Fortunately, there are many rewards to offset these punishments. Mrs. Campbell frequently recaptures the spirit and mystery of the Highlands with her nicely-turned anecdotes and dashes of local colour. To the lurid tales of Highland rascality she even manages to impart a flavour of heroic dignity, converting some of the most chilling and revolting massacres of ancient time into neo-Ossianic episodes. The MacDonalds among her readers will be pleased to find that, when she reaches Glencoe, she displays a proper sense of inherited blood-guilt: "This was Glencoe, and no one born to the name of Campbell, or having acquired it, can feel quite comfortable here, because of what happened one snowy February night in 1692."

The book is well supplied with maps and photographs, including some fine reproductions from the Adam Collection. Much more than an ordinary guidebook, it will inform and enrich the minds and hearts of those among us who still "in dreams behold the Hebrides," as well as those who wish they could.

JAMES GRAY

BISHOP'S UNIVERSITY.

The Canadian City

CITIES IN THE SUBURBS. By Humphrey Carver. Toronto: University of Toronto Press. 1962. Pp. 120. \$4.95.

"There is nothere there." With this cryptic phrase from Gertrude Stein, Humphrey Carver summarizes most of the sense and much of the nonsense which has been expressed in criticisms of our suburban

areas since 1945. With the outlook of a philosopher and the language of a poet, in a book both witty and serious, the author talks to the general public rather than to the urbanists. His tract is directed towards political action, in the hope that public understanding of the chaos in our city extensions will help create the instruments of excellence. Small tracts have achieved most of the major advances in urbanism, and it is to be hoped that this will achieve for Canada the revolution in outlook that Geddes and Ebenezer Howard achieved in their time. By sponsoring these 120 pages Central Mortgage and Housing Corporation has shown an unusual awareness of the public unease about the forms of our city-building. The book's idealism may yet create for the sponsor a new rôle as an agency of national development, and as the instigator of better civic sense in our metropolitan areas.

Lest the title mislead anyone into thinking that this is yet another book about suburbia, consider the author's assertion that "the town is the essential component part of which the metropolitan city must be constructed": we are to build towns, in constellations rather than shapeless amorphous agglomerations of suburbia. Our attention is directed to the total problem: to the shape of our cities and the manner of their extension rather than to the ideal qualities of suburbia. For a vivid summary of the effect of the street-car and the motor car upon the patterns of our life, the author traces the traditions and ideals which underly our urban areas and confronts us with the inadequacy of contemporary environment. Twelve excellent black-and-white illustrations by Zoltan Kiss and a parallel photographic summary of the case add to the forcefulness. He deals with the figures whose concepts overshadow Canadian urbanism: Howard, Wright, Le Corbusier and Clarence Perry. And then he devastates our assumptions of progress by showing the poverty of current theory and the inadequacy of current practice in "the exploding metropolis". The book may well become a classic in its time, for it is beautifully written.

The remedy proposed is to nucleate future city extensions around their social institutions, organized into "Town Centres". About

of Uranus in 1761 and the unsuccessful efforts to determine its orbit during the next 80 years, the author reveals the setting for the subsequent drama and incidentally provides a clear example of the race down the centuries between theory and observation, each pacing the other, one sometimes leading and then the other — both essential to the growth of knowledge of the physical universe.

A. VIBERT DOUGLAS

QUEEN'S UNIVERSITY.

Imperialism

EMPIRE. By Richard Koebner. Cambridge: Cambridge University Press. Toronto: The Macmillan Company of Canada Ltd. 1961. Pp. 393. \$7.65.

The purpose of Professor Koebner's study is to examine changing ideas about "empire" from the time of Scipio Africanus to that of the Congress of Vienna. At the outset the author describes the contrasting connotations attached by Romans of different periods to the term *imperium*. But the Roman Empire, and its Carolingian and "Holy Roman" successors, receive relatively brief treatment. Koebner is concerned primarily with the concepts of empire that prevailed first in Tudor and Stuart England, later in Great Britain and her American colonies, especially during the decades immediately preceding the War of Independence. He gives detailed attention, for example, to the imperial vision of Benjamin Franklin, the frequently unrealistic thought of Edmund Burke, the ruthless rationality of Adam Smith. Less famous figures, such as Governors Pownall and Bernard of Massachusetts, also had proposals for an improved relationship between colonists and mother country, and to their notions, too, Koebner devotes considerable space. Despite concluding chapters on the Irish problem and the era of the French Revolution and Napoleon, the book will be of greater value to those interested in the background of the colonial secession than to any other group of specialized students.

Competently written, but lacking in stylistic brilliance, *Empire* cannot be strongly recommended to the "general reader" seeking history of high literary merit. Some of the author's unexplained allusions — rather common in the first two chapters — may perplex those who do not already possess a good knowledge of the ancient and mediaeval periods. But the work seems impressive in erudition and sound in scholarship. It should certainly be included in any library collection either on imperialism in general, or on the coming of the American Revolution in particular.

K. H. W. HILBORN

UNIVERSITY COLLEGE,
UNIVERSITY OF WESTERN ONTARIO.

Scottish Journey

HIGHLAND HERITAGE. By Grace Campbell. London and Toronto: Collins. 1962. Pp. 256. \$4.50.

"After much study and research and planning," writes Mrs. Campbell, "and with a background of knowledge gained in previous visits, my husband and I took a summer to explore the length and breadth of the Highlands. This is the story of our journey, what we heard and saw and found out, and how we fared in the land of our ancestors."

The story and the journey begin at Glasgow, where the bonnie banks of Clyde are all but hidden by smog, and the Campbells happily take the high road to Loch Lomond, up through Tarbet to Crianlarich and thence, via Glen Dochart, to Killin on the south shore of Loch Tay. Then they turn south to Balquhiddy after skirting beautiful Loch Earn, follow the course of Strathyre as far as Callander, strike due west to the Trossachs, and south through Aberfoyle to Dumbarton. This is the first of a dozen well-mapped itineraries, the last of which takes them to Edinburgh, the heart of Midlothian.

While conscious of the scenic grandeur all about her, and fully aware of the living present, Mrs. Campbell devotes most of her book to Scotland's storied past. She is

he turned to poetry to express these memories. The period between 1912 and his own death in 1928 is that of his finest poems."

Though the concluding assertion may well be questioned, it is undeniable that his reading of the *Recollections* impelled in Hardy bitter regret for neglected real or fancied, and nostalgic memories of happier times, which found expression in a hundred or more poems. The editors append several of these poems, including the well-known "Beeny Cliff" and "After a Journey", with parallel passages from Mrs. Hardy's manuscript, and demonstrate beyond doubt Mrs. Hardy's influence on their making. "Words, phrases, incidents and even rhythms are echoed and repeated."

Only a few passages of *Some Recollections* support the editors' claim that the chief characteristics of Mrs. Hardy's style are "vivacity and charm". But we must agree that Hardy's debt to his wife "is here for the first time, acknowledged and clear for all to see".

EDWARD McCOURT

UNIVERSITY OF SASKATCHEWAN.

Essays in Criticism

HOMER. A collection of critical essays, edited by George Steiner and Robert Fagles. Englewood, N.J.: Prentice-Hall, Inc. 1962. Pp. x + 178. \$1.95 paper; \$3.95 cloth.

From a series which presents "the best in contemporary critical opinion on major authors", this volume on Homer contains poems and essays by writers of the first rank. The poems must speak for themselves. Among the essayists the editors are outstanding in "Homer and the Scholars" and "Homer and the Writers" respectively. On Homeric technique, Tolstoy, Pound and Auerbach discuss ancient epic's directness and simplicity; George Lukacs, in an extract from his *Probleme des Realismus*, contrasts narrative and description (who is responsible for the repeated howler, *mutatis mutandi*, p.88?); A. B. Lord, the man of the hour on oral composition, compares Homeric formula-epic with its modern Serbo-Croatian counterpart; J. C. Powys' preface to his

Homer and the Aether resembles an impromptu speech after a cheerful Old Boys' dinner.

On the *Iliad*, Rachel Bepaloff makes a thoughtful and somehow moving study of Helen; Cedric Whitman, in his slow sticky prose, discusses the imagery of fire. On the *Odyssey* (the favourite theme) Ernst Bloch treats variants of the Odysseus-legend; Gabriel Germain discusses the Sirens as figures of the knowledge that men seek to their own destruction; Kafka studies the silence of the Sirens; Dimock is stimulating on the meaning of Odysseus' name, as is Stanford on his untypical heroism. Robert Graves on the authoress of the *Odyssey* is followed by T. E. Lawrence on translations, and by Mr. Fagles, who relapses into a kind of super-jargon of criticism occasionally, but is very wise on the biographical adaptations of the *Odyssey* by Lawrence, Fitzgerald, Graves, Joyce and Pound.

The editors put down the truth when they wrote that they were offering, not a "manual of critical governance" but a "book based entirely upon the principle of delight".

H. L. TRACY

MCMASTER UNIVERSITY.

KAFKA. A COLLECTION OF CRITICAL ESSAYS. Edited by Ronald Gray. Englewood Cliffs, N.J.: Prentice-Hall, Inc. [1962] Pp. 182. Spectrum Paperback, \$1.95 (U.S.). Clothbound, \$3.95 (U.S.).

Since Kafka's death on June 3, 1924, some 5,000 articles and books have been written about his work, ranging from short reviews to Professor Emrich's 500-page monograph. In the present volume, Mr. Gray has gathered fourteen of the most sensitive and intelligent contributions to this seemingly inexhaustible subject. Thirteen of these — essays by Friedrich Beissner, Edwin Muir, R. O. C. Winkler, Johannes Pfeiffer, Caroline Gordon, Idris Parry, Edmund Wilson, Erich Heller, Austin Warren, Eliseo Vivas, Albert Camus and Martin Buber and a "Survey of Recent Kafka-Criticism" by H. S. Reiss — have been published previously elsewhere; of the remaining contribution, the editor's own

"Kafka the Writer", no source is given, but this study appears to have been written originally for oral delivery.

The editing of the book shows some signs of haste. The reader would probably have preferred a short biographical introduction to the Chronology provided by the editor; Dr. Reiss's extremely able survey of the literature on Kafka, which was first published in 1956, was brought up to date by the editor somewhat cursorily with a bare list of more recent publications; and the passages from Kafka's works which are quoted in English translation should have been checked against the original German. Thus, a passage from the story "The Judgment" is quoted in Beissner's essay in which the father of that story's hero "threw his blanket off", "stood upright in his bed", and called his son a scamp or good-for-nothing ("Früchtchen"). In the English version printed by Mr. Gray, the blanket is replaced by blankets, the father "sprang erect in bed" (whatever that means), and the son is called a "young sprig".

In spite of these defects, however, Mr. Gray's collection can be recommended warmly. It provides a good insight into the astonishing variety of ways in which Kafka's work can be experienced by thoughtful and able critics; and if the reader at the end of the book is likely to feel a little confused, this is due to no failing on the part of the contributors, but to the wise openmindedness of the editor, who gave space to views incompatible with his own; after all, it is the fate and perhaps the greatness of Kafka's work, in Camus' words, that it "offers everything and confirms nothing".

HANS EICHNER

QUEEN'S UNIVERSITY.

Science

THE DISCOVERY OF NEPTUNE. By Morton Grosser. Cambridge: Harvard University Press. Toronto: S. J. Reginald Saunders and Co. Ltd. 1962. Pp. 172. \$6.25.

This book is a valuable addition to the literature of science. The author has studied at M.I.T. and Stanford University and has sought out material at St. John's College, Cambridge, and in Paris.

John Couch Adams, a 26-year-old fellow of St. John's, after two years of intensive work on the perplexing problem of the orbit of Uranus wrote to Sir George Airy, Astronomer Royal, on October 21, 1845, "According to my calculations the observed irregularities in the motion of *Uranus* may be accounted for by supposing the existence of an exterior planet, the mass and orbit of which are as follows. . . ."

On June 1, 1846, Urbain J. J. LeVerrier, 36-year-old astronomer at Paris Observatory, presented to the Academie des Sciences a paper in which he gave his calculated data for the position and movements of an hypothetical eighth planet whose existence could produce the observed effects on Uranus.

The author gives a dramatic yet annotated account of the inexcusable apathy of Airy and the lethargy of Professor Challis of Cambridge; and of the appeal dated September 14, 1846, by LeVerrier to Galle at Berlin whose prompt search of that part of the sky indicated by LeVerrier's revised calculations led to the observation of the new planet on the nights of September 23, 24, "the most outstanding conceivable proof of the validity of universal gravitation" as Encke wrote to LeVerrier.

The drama enters a black phase with the disputes over the names Neptune, Oceanus or LeVerrier, and a still blacker phase when a mortified Astronomer Royal and Plumian professor tried to obtain some recognition for Adams for his prior solution of this stupendous problem, yet somehow justify their own lack of action. Narrow nationalism, together with a tense political bitterness over recent links forged between France and Spain, resulted in little that was creditable to either France or Great Britain.

The final scene shows the co-discoverers of Neptune meeting at the British Association in the summer of 1847, clasping hands cordially and forming a friendship which endured for thirty years. From these men we have the "legacy of a planet seen with their inner vision long before Neptune's disc was identified in the starry reaches of the night sky".

By beginning his book with an historical account, starting essentially with Galileo and Kepler, and recording in some detail Herschel's accidental telescopic discovery

UFO's A Scientific Debate

Edited by Carl Sagan and Thornton Page
Cornell University Press, Ithaca and London
{ pp xxxi + 310 }, 1972. \$12.50

In December 1969 The American Association for the Advancement of Science held a general symposium in Boston ~~to~~ ^{to discuss the many problems associated with} unidentified flying objects ^{described as anomalous observations phenomena} ~~from every point of view~~ of the Editors of this book organized the meeting bringing to it fourteen men of such widely diverse fields as physics, astronomy, atmospheric sciences, meteorology, psychiatry, psychology, sociology and the New York Times Science Editor.

In his ~~introduction~~ ^{the first paper} ~~published paper~~ Thornton Page refers to the 1969 Condon Report (a Bantam Book) prepared by Professor Condon from his two-year ^{studies} ~~findings~~ assisted by thirty-six staff members of The University of Colorado ^{with US Air Force support} ~~the conclusion~~

of which was that further study was not ^{justified} ~~worthwhile~~. At the other pole of thought ~~was the late~~ Professor J. E. McDonald, Institute for Atmospheric Physics, Arizona whose chapter is headed ~~Twenty~~ Years of Inadequate UFO Investigations. This is the longest chapter in the book, ^{over 70 pages,} and it recounts in detail ~~three~~ ^{four} sightings by airmen and civilians which the author considers to have ~~been made~~ ^{warranted} closer study. ~~He charged the Condon group with~~ ~~inexcusable lack of checking up on~~ ~~evidence.~~

A sixty-page chapter by Donald H. Menzel, formerly Director of Harvard College Observatory is entitled UFO's - The Modern Myth. He discusses the political propaganda aspect in ^{late 1940's and} the early 1950's when a wave of 'sightings' were reported from the USA west coast and the Pentagon was planning spy planes over the USSR. Sweden, ~~too~~, had its

UFO sightings following the second World War but these were explained when Air Force Intelligence found out that the USSR had taken over the German rocket programme at Peenemünde. ^{due to} Anomalous radar and optical mirage ^{phenomena} effects are discussed and a 2-page list of possible ^{causes} explanations is given under headings: material objects, immaterial objects, astronomical, physiological, psychological, radar and photographic phenomena. Menzel refutes some of McDonald's ^{arguments} and ^{deplores their} scoffs at his and J. A. Hynek's ^{conclusion} of Northwestern University ^{when} they ~~propose~~ ^{should} that NASA undertake a major investigation of UFO's and that Congress approve of a massive budget for this purpose. ^{of} ⁱⁿ ^{art and} ^{science} ^{and} ^{the} ^{fantastic} ^{flying} ^{objects} ^{of} ^{the} ^{Bible} ⁱⁿ ^{which} ^{he} ^{discusses} ^{such} ^{phenomena} ^{as} ^{Ezekiel's} ^{visions} ⁱⁿ ^{terms} ^{of} ^{'son-dog'} ^{and} ^{is} ^{part} ^{too} ^{occure} ^{the} ^{fantastic} ^{flying} ^{objects}

44

~~is in some painting by Hersch of the~~
~~Temptation of St. Anthony. Menzel~~

(what a few call The greatest scientific
problem of our age, Menzel calls the
greatest nonsense of the twentieth century
"anomalous observational phenomena" Baker, UCLA.

quotes several specific cases ^{of UFO sightings, observations, reports} and reports
of sightings and gives possible explanations
of witnesses, ~~giving~~ some of them in terms of the optics of
the human eye, especially if ~~not~~ myopic
or ~~with~~ ^{having} astigmatism, coupled with psychological
excitement and credulity. *

R. M. L. Baker, Jr. of UCLA, California
described his examination of ~~a~~ ^{the} ~~many~~
successive frames of motion pictures ^{of UFO's} sent to
him by people in the USA and elsewhere.
^{sent to him} Since 1954. On the whole it is an inconclusive
study. Where no reasonable explanation
can be found there remains some
anomalous observational phenomena

calling for ^{serious} further investigation ~~of~~
~~future occurrences~~. ^{Believers} There are however
 enough possibilities without invoking
 extraterrestrial intelligence.

Three chapters by a sociologist, ~~and two~~
 psychiatrist and a psychologist discuss
 beliefs, contagion of belief and hysteria,
~~and~~ ^{un}conscious bias and the abilities and
 limitations of witnesses. Scientists are
 themselves not always free ^{of these faults} and must keep
 open minds ~~of~~ the subject, steering a
 course between proclaiming UFO's
 the "greatest scientific problem of our
 age" ~~and~~ or shrugging ^{them} off as the
 "greatest nonsense of the twentieth
 century" ^(Menzel) Hynek quotes
 Schroedinger's advice: be curious,
 capable of being astonished, eager to
 find out.

Proof 9/5/73

for J. R. R. A. S. C.
 22/2/73

Donald Fernie. The Whisper and the Vision: Voyages of the Astronomers,
Toronto, Vancouver: Clarke, Irwin & Company Limited, 1976. Pp. 189, \$10.95.

This is a book of adventures by sea and land undertaken and carried through for worth while astronomical purposes. The style is racy and informal and the narrative moves rapidly, laced with occasional dry humour and packed, but not over packed, with interesting facts. The title comes from Kipling's A Song of the English: "We were dreamers ... We yearned beyond the sky-line ... Came the Whisper, came the Vision, came the Power with the Need..."

The author calls it "a light-hearted stroll down the corridors of astronomical history". Some of his descriptions are memorable: The Andes in Chile (p. 3), the Cape Peninsula (pp. 59 and 62). So, too, are descriptions of far places and turbulent seas quoted from the journals of the 18th and 19th century astronomers whose intrepid spirits were undaunted by manifold difficulties, dangers, delays and disappointments. Fernie asks himself "What dreams or visions or psychological needs (or perhaps just cheerful willingness?) drove these people to achieve what they did".

The first of four sections recounts the stories of six of many expeditions sent out by Britain, France and other nations to observe that rare phenomenon the transit of Venus across the solar disc. This occurs twice within a few years and then not again for a century. Two hundred years ago careful timing of the instant of contact, four observations in all, made at two places of known latitude and longitude would provide the data for the best measure of the sun's distance known at that time.

Mason and Dixon were to go to Sumatra running the gauntlet of hostile French frigates but during their many weeks at sea the French conquered the island so they observed the 1761 transit from Capt Town. Their good survey work at the Cape led to their being sent to the American colonies where they established their now famous "Line". Mason had been the ill-paid drudge at the Royal Observatory at Greenwich and Dixon was an Irish land surveyor of humble mining parentage.

Another assistant at Greenwich, William Wales was sent to Fort Churchill on Hudson Bay. The vicissitudes and hardships are vividly portrayed but he survived the winter's rigours and returned after fifteen months with good observations.

A party under Capt. James Cook with Charles Green, an astronomer, and Joseph Banks, an ardent botanist, sailed around Cape Horn and eventually reached Tahiti. Their adventures make a lively tale.

A French expedition under Jean-Baptiste Chappe d'Auteroche travelled overland to Tobolsk in Siberia, eventually to make successful observations. For the subsequent transit of 1769 he sailed for 77 days to Mexico. Then the slow journey across Mexico to the extreme south of Baja California. Disease claimed his life and played havoc with his men only one of whom survived to take the results back to the French Academy. Alexandre-Gui Pingré was sent to an island east of Madagascar carrying a letter from the British Admiralty instructing the Commanders of all British ships of war not to molest or impede Pingré's ship - in spite of the continuing state of war between the two countries. Intermittent rain hampered their observations. Ignoring the order for non-interference a man o' war attacked them, taking their ship as a prize. Four months later they boarded another French ship

only to be attacked again off Lisbon, their ship captured and they themselves put ashore in Lisbon. They returned overland to Paris after an absence of 15 months.

A third French expedition under G.-J.-H.-J.-B. le Gentil de la Galasière was designed to observe the transit at Pondicherry on the east coast of India. - Dogged by the British, by illness, by wind, the critical day in June 1761 found them afloat on the Indian Ocean where no observations could be made from a rolling deck. For seven years le Gentile explored and surveyed the island coasts, then after a hostile reception in Manila he sailed to Pondicherry. After months of clear weather came storm, wind and cloud on the crucial morning. Thirty thousand miles of travel and over eleven years away from home - and no results from either transit. "That is the fate", he wrote, "which often awaits astronomers."

Part two of this four part book relates the actions and reactions of the men who established the Royal Observatory at the Cape of Good Hope: Rev. Fearon Fallows, 1821-31, who struggled gallantly against diverse odds and succumbed to scarlet fever; Thomas Henderson 1832, whose one difficult year at the Cape included observations which contained the data which after his return home gave him the parallax of Alpha Centauri, the third star distance to be measured up to that time; Dr. Thomas Maclear 1833-70 who not only conducted the astronomical programme and Time service for navigators but carried through a large-scale geodetic survey of the colony. During the first four years of Maclear's sojourn, his friend the versatile, gifted Sir John Herschel had built his own observatory and a racy account is given of his life there and important achievements.

There follows a vivid account of the Scotsman Sir David Gill, his transit work in Mauritius, his determination of the solar distance on Ascension Island and his 28 years as Director of the Cape Observatory, a

life time of rich astronomical harvest which brought some twenty honours and friendship with Gen. Gordon, Cecil Rhodes, Kipling, Earl Grey, Sir Alfred Milner and many others.

The final section provides a lively account of the strenuous efforts of Solon Bailey to select the site and organize Harvard's southern station at Arequipa in the Peruvian Andes. In spite of the forbidding terrain, snakes and scorpions, revolution and William Pickering, this task was completed.

The informal personal touches throughout this book give it a freshness that captivate the reader. Twenty-one illustrations add to the interest, especially two from the pencil of Sir John Herschel.

A. Vibert Douglas

10 April, 1977

The Claim of Scotland. By H. J. Paton.

London: George Allen and Unwin, 1968;

Pp. 279. \$9.50

"There has been in England a gradual and progressive system of assuming the management of affairs entirely and exclusively proper to Scotland, as if we were totally unworthy of having the management of our own concerns". So wrote Sir Walter Scott at least one hundred and thirty six years ago (for he died in 1832). Scotsmen have been very very patient; far too patient for their own good. Westminster is of course dominated by the English, and bureaucrats among them seek for administrative convenience "to blot out 'regional' and other differences: almost absent-mindedly [this] destroys by stages everything which is distinctive of Scotland and has been the source of her greatness."

Indignation over the political blindness and arrogance of Westminster boiled over in blood-red revolution in Ireland in 1916. Today, fifty years later, more and more young people in both Scotland and Wales are deeply and passionately concerned. Their indignation, too, will reach a boiling point. Already at the polls the Scottish National Party has won seats, an argument no politician can ignore.

"This is a book that had to be written," says its author Professor H. J. Paton, Fellow of the British Academy, Gifford lecturer in 1950 and 1951, and author of the six volume History of the Peace Conference of Paris and Kant's Metaphysics of Experience. "It is hard not to feel some emotion as one examines the raw deal given to Scotland in the past and in the present." With great restraint this book sets forth some of the injustices perpetrated on the Scottish people. "I have sought to present the claim of Scotland as

essentially an appeal to right and reason." A Scottish Parliament, with Ministries of Commerce, Labour and National Insurance (as in Northern Ireland) is not just the demand of a "lunatic tartan fringe". Implementation of the assumption that whatever may suit England must ipso facto be well adapted to the needs of Scotland has produced "the feeling of frustration so wide-spread in Scotland at the present time."

After chapters on History and Legend, In all loyalty to the Crown, Frustration in Parliament and Bureaucrats in the Saddle come some nine chapters setting out specific examples of injustice and causes of dissatisfaction in matters of law, taxation, railways, ships, transport both road and air, hydroelectric projects, coal, emigration and unemployment, broadcasting and language, education at school and at university level.

This book is extremely well written and without bitterness. It will fire the minds of Scots everywhere and if only the men of Whitehall will read it they must surely look upon Scottish Nationalism as a reasonable and necessary movement.

I am reminded of the remark attributed in 1918 to Kaiser Wilhelm that it was interesting how many of the English generals were Irish! Too many people equate Britain with England and British with English. The writing of this book gave its author no pleasure, but in writing it he has served well the cause of Scotland, the cause of justice and reason.

A. VIBERT DOUGLAS

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 Siberia ~~via~~ ~~the~~ ~~Ural~~ ~~mountains~~

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~~The tedious crossing of the Isthmus~~
3 ~~then~~ the slow journey across America
1 behind him he made excellent
to the extreme south
observations at the extreme south

of Baja California, but Disease
claimed his life and
1 played havoc with his men only
one of whom survived to take the
the results back to the French Academy.

Alexandre-Gui Pingre was sent to
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carrying a letter from the British
Admiralty ^{instructing} ~~commanding~~ the Commanders
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a man 'o war attacked them ~~before~~
~~they were to leave the island~~, taking
 their ship as a prize. Four months
 later they ~~were able to sail for home~~
~~in another French ship only to be~~
 attacked again off Lisbon, their ship
 captured & they themselves put ashore
 in Lisbon. ~~they~~ ^{they} ~~and~~ ^{returned} ~~make their way~~ overland
 to Paris after an absence of ~~over~~ 15
 months.

A third French expedition under
 G.-J.-H.-J.-B. le Gentil de la
 Salasiere was designed to ~~observe~~ ^{observe} ~~at its~~
~~observation station~~ ^{the transit} at Pondicherry on
 the east coast of India - Dogged by
 the British, by illness, by ~~the~~ winds,
 The critical day in June 1761 found them
 afloat on the Indian ocean where no
 observations could be made from a
 rolling deck. For ~~eight~~ ^{seven} years le Gentil
 explored and surveyed the island

7
after a hostile reception in
coasts, then ~~went to~~ ~~Maunla~~ ~~to~~
~~prepare for the 1769 transit~~. But
~~he had an hostile reception there~~
~~and then French Academy orders~~
~~he sailed~~ ~~to go to~~ Pondicherry. After months
of clear weather, ^{came} storm, wind and cloud
on the crucial morning. Thirty thousand
miles of travel and over eleven years
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"That is the fate," he wrote, "which
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Part Two of this four part book
relates the actions and reactions of
the men who established ^{the} ~~His Majesty's~~
Royal Observatory at the Cape of Good Hope:
Rev. Aaron Tallow 1821-31, ^{who struggled gallantly against diverse odds and succumbed to scarlet fever}; Thomas
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year at the Cape ^{included observations which} contained ~~of~~ the data ~~from~~
which after his return home gave
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to be measured up to that time; ~~and~~
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 not only conducted the astronomical
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 large-scale geodetic survey of the
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 versatile, gifted Sir John Herschel
 had built his own observatory and
 a racy account is given of his
 life there and ^{important} ~~great~~ achievements.

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985
-58
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A. Vibert Douglas

10 Apr. 1977

Rutherford.

By Sir Arthur Eddington.

"We've got a rabbit here from the Antipodes and he's burrowing mighty deep." The allusion was to a young New Zealander, an 1851 Exhibition student, who was working in the Cavendish Laboratory at Cambridge. For forty years the burrowing continued and deepened. When in 1937, the mortal remains of Lord Rutherford were laid to rest in Westminster Abbey, the scientific world knew that it had lost its most outstanding leader. By his individual researches Rutherford ranks with the greatest of his predecessors; as an inspirer and leader - as a driving power, directing the energy of enthusiastic followers throughout the world - there is no one to compare with him.

Rutherford's supreme discovery was the atomic nucleus. The nucleus indeed represents his life-work. He had been working continuously on the nucleus twelve years before he knew that such a thing existed. He paved the way for it; he discovered it; he disintegrated it. The discovery was experimental, being indeed scarcely credible according to the physical theories of the time. But Rutherford had working under him in his laboratory at Manchester two of the ablest theorists, Bohr and Moseley, who each in turn made far-reaching advances and established the new picture of atomic structure as the basis of further progress. The discovery of the nucleus

/made

made an end of the billiard-ball conception of the atom, dear to the mechanistic outlook of the nineteenth century. For the billiard ball was substituted a microcosm - something like a small scale model of the solar system, with Rutherford's nucleus playing the part of sun and electrons representing the planets. Thus faded the last vestige of "solidity" in the scientific conception of the world around us.

Deep burrowing for Rutherford, was not a refuge from everyday life. Bernard Shaw has made a play of a meeting of Newton with his most incongruous contemporaries; but Rutherford would have given small opportunity to the dramatist, for I cannot imagine any meeting which would have found him at a loss. His intense vitality was amazing. Notwithstanding his strenuous output of work and heavy responsibilities he never gave the impression of being strained or hurried. He found time for reading; history, especially military history, seemed to be his favourite subject. Of the various epithets applied to him in the book under review, there are two which I think fit him most closely. "Boyish" was inevitable; no one could miss that on the briefest acquaintance. The other goes deeper into the meaning of his life; he of all men was "the happy warrior."

In Prof. Eve's biography the story of Rutherford's life is told largely in extracts from his letters. Much the most interesting are those which he wrote to Mary Newton, afterwards Lady Rutherford, during their long engagement which covered the three years when he was a research student in Cambridge. These have a candour and gusto which is lacking in the less intimate correspondence covering the later phases of his career. These early letters have a double interest, because they reveal vividly both the student and his Professor, J.J. Thomson. It is the happiest of pictures. On the one hand the uncouth colonial, diffident yet feeling within himself the power to make good, deeply grateful for encouragement. On the other hand, the Professor helping him in every way, scientific and personal, and showing throughout a consideration and appreciative interest the more remarkable when we reflect that this was just the time when "J.J." was beginning his own absorbing chain of discoveries in a field remote from that in which Rutherford's work then lay.

I suppose that in any case the most interesting period of such a life as Rutherford's must be the critical time before he rose to an assured position and reputation. Afterwards life is unadventurous, and the romance is only to be discerned by those who follow him in spirit as stage by stage his work achieves its aim. It is no fault of the biographer that the later chapters tend to become a chronological record of researches, public lectures, honours, and the manifold

/public

public duties which are a penalty of distinction. Scientific readers will appreciate the accurate history of the development of his branch of physics, as shown in the letters and the well-judged explanations which link them together. With that we must fain be content. Alas, there was no Boswell to take contemporary note of his conversation - to tell of "thy merriment that was wont to set the tables on a roar", the leg-pulling, the neat recovery when outspokenness had caused him to put his foot in it, and all the good things of jovial fellowship. But, to quote Lord Baldwin's Foreward, "As ^{well} might one essay to distil the essence of the wind. One can only say he was a man, a peer among men: he was Rutherford."

The Copernican Revolution by Thomas S. Kuhn. Harvard University Press, 1957, pp. xviii + 297.

James B. Conant who writes the Foreword and Thomas S. Kuhn of Berkeley, California, the author of this book, are deeply concerned that "the curious interplay of hypothesis and experiment (or astronomical observation) which is the essence of modern science" is largely unknown to the nonscientist. For "science is but one phase of the creative activities of the Western World which have given us art, literature, and music." Dr. Kuhn discusses the revolution in thought initiated by Copernicus in the manner which he believes to be needed if the scientific tradition is to take its place beside the literary tradition in our culture.

The Copernican revolution was of threefold significance. Astronomy had to cut the binding cords which for seventeen centuries had enmeshed it with the Aristotelian postulates and theories. Cosmology had to take full cognizance of the newly developing physics of the 150 years following Copernicus's death. All thinking men had to disentangle their Christian beliefs and theological doctrines, their natural philosophy and their cosmological speculations from the traditional, the hypothetical unit "ancient wisdom."

The early chapters deal with the task of the Greek observers who sought to explain the apparent motions of the sun, the moon, and the five visible planets about a central or near-central earth, against the background of the steadily moving sphere of the stars, complicated in the later years of their era by the discovery of the precession of the equinoxes.

Hellenic science is distinguished from Hellenistic science. The former was philosophical and only partially successful; Aristotle, "the Master of those who know," was its greatest proponent. The latter was geometric, to

some extent quantitative, exceedingly complicated, very beautiful, and much less unsuccessful; Ptolemy of Alexandria was its effective expositor.

In the thoughts of the early Christian Fathers these two lines of approach to cosmology were telescoped, though 500 years separated Aristotle and Ptolemy. The efforts of Augustine and Aquinas to square their readings of Aristotle with certain passages of the Scriptures are discussed in some detail. The influence of Dante is stressed in diffusing widely far beyond the ranks of scholars the Aristotelian universe both as the actual cosmological picture and as the symbol of man's life and future destiny.

The ideas of Nicole Oresme are given to illustrate how scholastic critics of Aristotle began to prepare men's minds for the drastic change which Copernicus's innovation was to bring about.

Fifty pages are devoted to De Revolutionibus and the next forty to the assimilation of Copernican astronomy in the years following 1543. To readers outside the ranks of astronomers, the book was somewhat unreadable, but the practising astronomers soon found many of Copernicus's mathematical techniques indispensable and thus its importance was recognized before large-scale clerical opposition came to a head.

Copernicus's prestige soared steadily in astronomical centres throughout Europe as the superiority of tables prepared by Erasmus Reinhold (1551) by Copernican methods became evident. Whether or not to assert belief in his cosmological postulates was another matter. John Donne felt that the new scientific theory would win out, but he and, fifty years later, John Milton were filled with apprehension for the future since "the Christian drama and the morality that had been made dependent upon it could not be adapted to a

universe in which the earth was a planet and new worlds could continually be discovered." The bitter Protestant opposition to Copernicanism is attributed to the desire of Luther and Calvin to return to a pristine Christianity based on the Bible as the single source of Christian knowledge.

From 1616 to the incredibly recent date of 1822 the Roman Catholic church made anti-Copernicanism a doctrinal issue, and in the earlier part of this period the grim weight of the Inquisition was directed against the Copernicans.

In spite of clerical opposition and lay timidity and conservatism of thought, the Copernican revolution moved on to its inevitable fulfilment through many stages of restatement. Chapters 6 and 7 outline the part played by Tycho Brahe, Kepler and Galileo and the contributions of René Descartes, Newton, and Robert Hooke. There follows a survey of the present scene with passing reference to Bohr, Planck and Einstein and to the fact that this century is witnessing a further revolution in cosmological thought.

The moral of the book is this: no scientific theory should be permitted to become a creed!

This book is well printed, contains two useful lists of reference books and a short technical appendix. It deserves to be read; whether it will achieve its author's worthy aim must be left to each reader to decide.

T. Q. Q.

1957 Oct 22

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