weight of the adrenal, the level of ascorbic acid and cholesterol were also found to be increased and also the enzyme 3β HSD showed increased activity. The minor fall in adrenal cholesterol level was noticed. Rise in serum cholesterol level was known after the application of oral contraceptive[1]. Significant fall in tissue cholesterol level may not be occurring during the 3-month treatment. From the above results it may be suggested that adrenal was in a state which may undergo hyperactivity in prolonged treatment of Lyndiol. Deb *et al.*[6] showed that both cholesterol level and 3β HSD of adrenal gland was increased after malonate treatment which was due to increased steroid hormone synthesis for stimulation of pentose phosphate pathway by Malonate.

Bernstein and Biskind[3] showed that administration of oestrogen causes adrenal hypertrophy. In the present study, the tendency towards hyperactivity may be the action of oestrogen present in Lyndiol.

On consideration of the above facts, it can be postulated that Lyndiol, the well-reputed oral contraceptive, causes the hypofunction of the ovary and may cause hyperactive adrenal on prolonged treatment.

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REVIEWS AND ANNOUNCEMENTS

Functional Equations in Economics. By Wolfgang Eichhorn. (Addison–Wesley Publishing Company, Massachusetts, USA), 1978.

The author claims that his book is the first comprehensive treatment of the subject "functional equations in economics".

By functional equations, the author follows Aczél (1966) in treating them as equations, both sides of which are terms constructed from a finite number of unknown functions (of a finite number of variables) and from a finite number of independent variables. The functional equations determine the unknown functions.

Using the well-known results from Cauchy and Pexider to Aczêl, the author shows with impressive clarity the applications of functional equations to business mathematics, the theory of the firm, the theory of growth and technical progress, the theory of aggregation, and as a novelty, the theory of index numbers.

For example, the author shows that if $S(p, w)$ is the sales function of a firm which spends w on advertizing and charges p as price, then on the functional assumption that a *multiplicative* change in advertizing expenditure produces *an additive* change in sales, *i.e.*, $S(p, \lambda w) = S(p, w) + T(p, \lambda)$.

It can be shown using Cauchy's results that $S(p, w) = e^{-ap}(a + b \log w)$ where a, b, and a are constants.

Another example that the author employs to illustrate the use of functional equations is in the derivation of production functions. The derivation of the generalized ACMS production functional form is far neater than Uzawa (1962).

In utility theory, the author shows that if $\Phi(x_1, \cdots, x_n$ is the utility function and satisfies the condition that $\Phi(\lambda_1 x_1, \cdots, \lambda_n x_n) = \phi(\lambda_1, \cdots, \lambda_n)\, \Phi(x_1, \cdots, x_n)$, then the functional form of Φ and ϕ will be the same. This result obtained by Pexider's theorems is rich in implications for consumer theory.

The author's most novel chapter is on the theory of index numbers. Borrowing from the results obtained by Fisher (1922), Frisch (1930), Subramaniam Swamy (1965), and Samuelson and Subramaniam Swamy (1974) and others, the author processes a number of new results using theorems of functional equations. Some of these results have already been published in the author's earlier papers on the subject.

The printing is good, and the exposition style is easy and engrossing. There are some misprints however, (for example on page 11, equation (1.6.1)) which need not however detract from the general quality of the book. The author in my opinion produced a "must read" book for budding mathematical economists.

SUBRAMANIAM SWAMY.

Soyabean and Weather (WMO Technical Note No. 160) (WMO, Geneva, Switzerland),
Price not known 1978. Pp. xvi + 64. given.

After giving a brief description of the soyabean crop in Chapter 2, the author traces the origin and history of crop in Chapter 3. Evidences of the crop being cultivated since 2838 B.C. have been cited. The crop was confined largely to the Orient until the third decade of the 20th century. But, now, USA contributes 67·2% of total world's soyabean production and its productivity is also very high. The uses of soyabean as a major protein and oil source for men and cattle are mentioned.

Wide distribution of wheat as compared to soyabean has been brought out by means of maps and difference is attributed largely to larger heat requirements and difficulty in breeding soyabean cultivars insensitive to day length.

The author has presented data of average temperature and humidity as well as normal dates of sowing, flowering and harvest in respect of important soyabean growing areas of the world. In the northern hemisphere, the crop is generally sown in May/June, flowering occurs in mid-August and harvesting in October. In Brazil of southern hemisphere also the pattern is similar.

The author points out to an important fact that soyabean would flower in the field only when the days are shortened below a critical value for a particular variety and this is mainly responsible for its limited distribution. An elaborate analysis of all the climatological requirements as the possible cause for the limited distribution of soyabean crop has, however, not been made in the Technical Note. More studies on these lines would indicate potential regions where soyabean crop can be introduced.

It is brought out that the basic climatic requirements of corn and soyabean are similar, but the latter is more drought-resistant than the former. However, further elaborations in terms of distribution of these crops have not been given.

The authors has done an excellent job in reviewing various researches relating to temperature and light effects on the growth of soyabean, effect of photoperiod on flowering and maturity, water requirement studies, studies on internal water balance and physiological processes.

The calorie requirement of soyabean crop does not fully explain its phenological behaviour. So, day length has been included in the analysis as a bioclimatic element interacting with temperature. Adopting the method of delineation of agro-climatic zones by Pascale, the author classifies the bio-climatic requirements of soyabean as photoperiodic, thermal and hydrological. The author takes 100 mm water deficiency line as an acceptable boundary for soyabean growing regions without irrigation and defines different hydrologic regions by different grades of water deficiency. But there is no indication of the method by which this water balance analysis has been carried out. The thermal regions are defined by the sum of daily air temperatures above 15° C in the growing season. The index for photoperiod is defined in terms of the length of day at summer solstice in hours and the types of varietal precocity indicated for different regions. Maps showing such agro-climatic types have been presented for USA, Argentina and Southern Brazil. Climatic effects on soyabean quality (oil and protein percentages) have also been studied by the author.

On the whole, the Technical Note is an extremely useful publication for soyabean breeders, agronomists and persons concerned with crop planning.

A. KRISHNAN.

Quaternary Geology—A Stratigraphic Framework for Multidisciplinary Work. By D. Q. Bowen. (Pregamon Press Ltd., Headington Hill Hall, Oxford, OX3 OBW, England), 1978. Pp. xi + 221. Price: Hardcover $ 30.00; Flexcover $ 12.50.

The text book on "Quaternary Geology—A stratigraphic framework for multidisciplinary work" by D. Q. Bowen is a very useful publication brought out by Pergamon International Library. There are very few authoritative books encompassing Quaternary Geology and Geomorphology. Therefore, the present publication is of great assistance to research workers, students and other environmental geologists. The Quaternary is one of the most interesting geological periods because of the evolution of man during this period. Quaternary deals with geological processes and dated about 1·62 m.y. The stratigraphic record is very fragmentary and one has to rely on various

other disciplines to evaluate the Quaternary sediments. A wealth of data in recent years has accumulated on Quaternary with various applications and new techniques on Oxygen Isotopic analysis, Radiometric dating and Magneto-stratigraphy. The introduction of these latest techniques has considerably enhanced our knowledge of the Quaternary Period.

Prof. Bowen in about 10 chapters has brought out in very clear terms the various aspects of Quaternary Geology including many new techniques and concepts adopted for deciphering the stratigraphy. By comprehensive and detailed study Prof. Bowen has done excellent work in highlighting some of the Quaternary events and critically analysing the classical Alpine models on the basis of four glaciations. Much of the work detailed in this book no doubt applies to Europe and U.S.A. However, many of the informations can usefully be utilised for the study of Indian Quaternary Formations. It is now known that the four classical glaciations occurred during late Quaternary encompassing, a time span of 0 85 my. The author has provided the reader a comprehensive material on Quaternary and this book is, therefore, recommended to students, research workers, Archaeologists and Geologists who in a brief ten chapters will be able to gain access to the intriguing and complicated period of geological history namely—Quaternary.

K. N. PRASAD.

INTERNATIONAL SEMINAR ON THE MANAGEMENT OF ENVIRONMENT

International Seminar on the Management of Environment has been organized by Dr. A. K. Ganguly, Felicitation Committee at Bhabha Atomic Research Centre, Bombay, from 11th to 15th February 1980. The following areas are listed for the information of authors who wish to present their scientific/technical investigations on the Management of the Environment : (*a*) Aquatic Environment, (*b*) Climatic Changes, (*c*) Human Settlement and Habitat and (*d*) Waste Management. Details can be had from Dr. D. B. Patel, (Convener, Dr. A. K. Ganguly, Felicitation Committee), Health Physics Division, Bhabha Atomic Research Centre, Trombay, Bombay 400 085, India.

A THREE-DAY INSA SYMPOSIUM ON INSECT VECTOR BIOLOGY

Under the auspices of Indian National Science Academy, New Delhi, a three-day symposium on Insect Vector Biology will be held at Madras from 22nd to 24th November 1979. Details can be ascertained from the Convener Dr. T. N. Ananthakrishnan, Director, Zoological Survey of India, 34, Chittaranjan Avenue, Calcutta 700 012.

INDIAN NATIONAL SCIENCE ACADEMY AWARDS

Prof. C. N. R. Rao, Indian Institute of Science, Bangalore, has been awarded the S. N. Bose medal for his contribution in the field of solid state science and spectroscopy and molecular science. Dr. D. S. Kothari has been given the Meghnad Saha medal for 1978 for his contribution in the field of physics. Prof. D. P. Burma, Banaras Hindu University, Varanasi, has got the Jagdish Chandra Bose medal for 1980 for his contribution to intermediary metabolism and molecular biology. Dr. Salim Moizuddin Abdul Ali has been awarded the C. V. Raman medal for 1979 for having placed India on the world map of ornithology. Dr. V. G. Jhingran, former Director, Central Inland Fisheries Research Institute, Barrackpore, has been given the Chandrakala Hora memorial medal for 1980 for his contribution to the development of fisheries in India and Dr. J. B. Auden the D. N. Wadia medal for 1980 for his contribution in the field of earth sciences.

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