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SCIENCE, RELIGION AND SOCIAL ETHICS[1]

By Sir RICHARD GREGORY, BART.

RETIRING EDITOR OF NATURE

MANY reasons have been put forward to account for the origin of religion, but it can not be said that any of them have solved the problem. Ancestor worship, ghost propitiation, worship of the soul, belief in spiritual beings, reverence for tribal leaders, have all been suggested as originating causes of religious sentiment. Primitive man had no religion except such as was embodied in a system of social virtues. Men possessing these virtues to a high degree, and using them to make the tribe powerful or conditions of life more pleasant, would be esteemed as benefactors or heroes not only during life but after death, and this veneration would develop into ancestor worship and later into soul worship.

[1] Concluding part of the fifth Elihu Root Lecture of the Carnegie Institution of Washington, given on December 8, 1938. The substance was included in a lecture before a general session of the American Association for the Advancement of Science, Richmond, Virginia, December 29, 1938.

If it is assumed that the divine purpose of the existence and evolution of life upon the earth is that man should work out his own salvation, it is difficult to understand what the ultimate gain will be when the earth will no longer be in a condition to maintain life as we conceive of it. All that science can say as to the future of the earth, or of any other planet or system in the astronomical universe, is expressed in the words of the hymn, "Our little systems have their day: they have their day and cease to be." We may contemplate the progressive development of man and society to any stage that may satisfy our ideals, but, so far as we now know, the whole phantasmagoria will eventually be dissolved, and the death of mankind will be the final penalty for achieving the highest type of humanity conceived by the human mind. This thought should not, however, be subversive of effort and aspiration on the part of humanity as a whole, any more than the

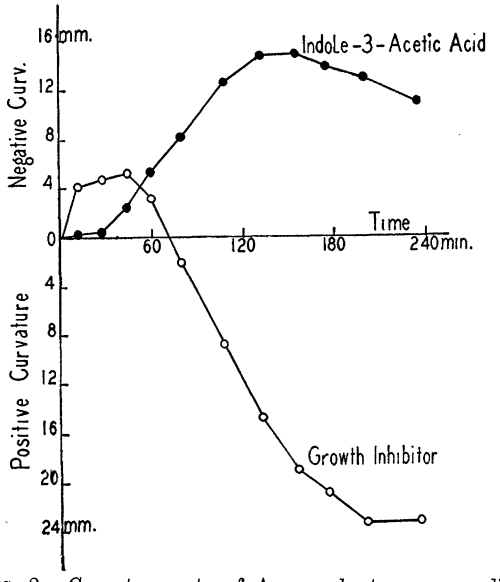

FIG. 2. Curvature rate of Avena plants upon application of: (*a*) .05 mg/liter, indole–3–acetic acid, and (*b*) growth inhibitor. (Ordinate values given as mm deviation of the extended coleoptile from the vertical position.)

sented in Fig. 2. It is observed that a negative curvature is initiated which rapidly changes between the first and second hour to a positive curvature, reaching its maximum three hours after the application of the inhibitor. It is interesting to note that the reaction rate for this negative curvature is different from the negative curvature caused by auxin. This is shown by the control run made at the same time as the inhibitor test but by using a growth-promoting substance, indole –3–acetic acid, .05 mg per liter. Each point on the graph is the average of twelve Avena test plants.

Inhibitor was found in the cotyledons of radish plants grown in the light or dark, but it was not found in the hypocotyl in either case.

The inhibitor substance is of neutral character. Accordingly as one would expect on the basis of Went's[4] potential gradient theory of auxin transport, it should be transported acropetally as well as basipetally. Experiments prove this to be the case, as was shown by equal amounts of inhibitor passing through normal and inverted 4 mm long sections of Avena coleoptiles. Similar experiments show there is likewise no inhibitor transport polarity in radish hypocotyl sections.

In conclusion, it may be said that the positive curvatures resulting from the application of the inhibitor are not to be considered the same as the positive curvatures resulting from the retardation of the physiological tip regeneration in the Avena coleoptile because these are usually of slight magnitude, and furthermore they are never preceded by a negative curvature during the first hour.

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[4] F. W. Went, *Jahrb. wiss. Bot.*, 76: 582, 1932.

BOOKS RECEIVED

American Philosophical Society; Transactions Held at Philadelphia, January, 1939; New Series—Vol. XXXI, Part 1: The Discoveries of Antarctica within the American Sector, as Revealed by Maps and Documents, by WILLIAM H. HOBBS; Pp. 71. Illustrated. $2.50. *Vol. 80, No. 2, January 31, 1939; Post-Natal Development of the Human Outer Nose,* by CHARLES B. DAVENPORT. Pp. 175–354. 84 figures. 18 plates. $1.00. The Society, Philadelphia.

Carnegie Foundation for the Advancement of Teaching; Thirty-third Annual Report, 1938. Pp. 239. The Foundation, New York.

CHANDRASEKHAR, S. *An Introduction to the Study of Stellar Structure.* Pp. ix + 509. 38 figures. University of Chicago Press. $10.00.

DARRAH, WILLIAM C. *Principles of Paleobotany.* Pp. 239. 6 plates. Chronica Botanica, Leiden, Holland. Stechert, New York. Guilders 7. $4.00.

EMMONS, WILLIAM H. and others. *Geology; Principles and Processes.* Second edition. Pp. xii + 451. 468 figures. McGraw-Hill. $3.75.

ENGEL, WILLIAM. *Sensible Dieting and the Engel Vital Calorie Diets.* Pp. xi + 408. Knopf. $2.50.

Implications of Research for the Classroom Teacher; Joint Yearbook, American Educational Research Association and the Department of Classroom Teachers. Pp. 318. Illustrated. National Education Association, Washington. $1.00.

LIVINGSTON, ROBERT. *Physico Chemical Experiments.* Pp. xi + 257. 70 figures. Macmillan. $2.25.

MACINNES, DUNCAN A. *The Principles of Electrochemistry.* Pp. 478. Illustrated. Reinhold. $6.00.

MORTON, DUDLEY J. *Oh, Doctor! My Feet!* Pp. ix + 116. Illustrated. Appleton-Century. $1.50.

O'RAHILLY, ALFRED. *Electromagnetics; A Discussion of Fundamentals.* Pp. xii + 884. 73 figures. Cork University Press. 42/–.

OTTO, R., K. FELIX and F. LAIBACH. *Chemie und Physiologie des Eiweisses.* Pp. xii + 203. Steinkopff, Dresden. RM. 9.

Schafer's Essentials of Histology, Descriptive and Practical, for the Use of Students. Fourteenth edition. H. M. CARLETON, Editor. Pp. xii + 618. 665 figures. Lea and Febiger. $5.00.

STEPHENSON, MARJORY. *Bacterial Metabolism.* New edition. Pp. xiv + 391. Illustrated. Longmans, Green. $7.50.

Travaux et Memoires de L'Institut D'Ethnologie, XXXI, Proverbes et Dictons Syro-Libanais, by MICHEL FEGHALI. Pp. xvii + 850. 187 fr. 50. *XXXII, Jeux Dogons,* by M. GRIAULE. Pp. vii + 290. 131 figures. 12 plates. 87 fr. 50. Universite de Paris.

VON RICHTER, VICTOR. *The Chemistry of the Carbon Compounds, Vol. II, Third edition.* Translated and revised by T. W. J. TAYLOR and A. F. MILLIDGE. Pp. xii + 656. 2 figures. Nordemann. $15.00.

WEYL, HERMANN. *The Classical Groups; their Invariants and Representations.* Pp. vii + 302. Princeton University Press. $4.00.

WHILLIS, JAMES. *Elementary Anatomy and Physiology,* Pp. ix + 342. 87 figures. Lea and Febiger. $3.50.

WOLF, A. *A History of Science, Technology, and Philosophy in the Eighteenth Century.* Pp. 814. 345 figures. Macmillan. $8.00.