

PHYSICS

New H-Bomb Trigger?

► **BABY HYDROGEN BOMBS** exploded without a triggering A-bomb are foreseen from the report of a possible new method, using shock waves, for setting off H-bombs.

Dr. G. O. Jones, professor of physics at Queen Mary College of the University of London, made this suggestion.

For several years there has been speculation on the possibility of a method other than an atomic bomb for detonating the hydrogen, or fusion, bomb.

Originally it was thought that only an atomic, or fission, bomb could produce the extremely high heat required to trigger the H-bomb.

Shock waves might generate "such high temperatures," Prof. Jones said, that they could be used to set off H-bombs.

Shock waves are increasing in importance as the inter-continental ballistic missile era approaches. The sharp sound heard when a jet passes through the sound barrier is due to the shock wave.

Explosions as well as the extremely rapid motion of airplanes or guided missiles can cause shock waves.

Using shock waves to set off hydrogen bombs might allow building a baby hydrogen bomb. It could be exploded without using up precious fissionable uranium 235 or plutonium.

With the new triggering method, the H-bomb could be made very little or very big as desired. The A-bomb must have a minimum mass, probably about 50 pounds, to be set off in an uncontrolled chain reaction.

Hydrogen bombs without an accompanying A-bomb would not be detected by Geiger counters or other radiation detecting

devices, since they would not release the tell-tale radiation until exploded.

The light elements of the hydrogen bomb, generally thought to be deuterium, tritium or lithium, are widely available. Any nation, big or small, could make baby H-bombs after solving the detonation problem.

Pressure Discontinuities

They occur, Dr. Jones explained, when matter at one pressure passes through matter at a very different pressure. "Sharp pressure discontinuities" are thus formed, generating high temperatures.

Scientists use a simple device known as a shock tube to make shock waves in the laboratory, where they can be studied under controlled conditions. They generate a shock wave by puncturing a diaphragm separating regions of high and low pressure.

"For a pressure ratio of about 500, in the most favorable case," Prof. Jones reported in *Discovery* (July), "a velocity corresponding to Mach 20 (that is, 20 times the velocity of sound) should be reached, and in argon this would be expected to give a temperature of about 16,000 degrees—which is sufficient to cause appreciable ionization.

"Velocities at least up to Mach 34 have actually been reached experimentally in shock tubes."

Prof. Jones said that, at present, "one of the most promising approaches for the generation of very high temperatures seems to be to cause shock waves to overtake or collide with each other, or to meet some other barrier."

Science News Letter, July 30, 1955

• Books of the Week •

For the editorial information of our readers, books received for review since last week's issue are listed. For convenient purchase of any U. S. book in print, send a remittance to cover retail price (postage will be paid) to Book Department, Science Service, 1719 N Street, N.W., Washington 6, D. C. Request free publications direct from publisher, not from Science Service.

AMPHIPODA COLLECTED AT THE ARCTIC LABORATORY, OFFICE OF NAVAL RESEARCH, POINT BARROW, ALASKA, by G. E. MACGINNIE—Clarence R. Shoemaker—*Smithsonian*, 78 p., illus., paper, 75 cents. The tiny sea creatures reported here include 100 species, of which nine are new.

CLINICAL BIOCHEMISTRY—Abraham Cantarow and Max Trumper—*Saunders*, 5th ed., 738 p., illus., \$9.00. Virtually completely rewritten.

EDUCATORS GUIDE TO FREE FILMS—Mary Foley Horkheimer and John W. Diffor, Eds.—*Educators Progress Service*, 15th ed., 591 p., paper, \$6.00. Listing 3,069 titles of films, of which 732 were not listed in the previous edition.

ELEMENTS OF ZOOLOGY—Tracy I. Storer and Robert L. Usinger—*McGraw-Hill*, 552 p., illus., \$5.50. A text for an elementary college course, especially when it is limited to one semester.

EVALUATION OF MAMMARY-GLAND DEVELOPMENT IN HOLSTEIN AND JERSEY CALVES AS A

MEASURE OF POTENTIAL PRODUCING CAPACITY—W. W. Swett, J. H. Book, C. A. Matthews and M. H. Fohrman—*Govt. Printing Office*, USDA Technical Bulletin No. 1111, 44 p., illus., paper, 25 cents. External appearance of the udder was found to be deceptive, but the gland development inside, which could be felt with the fingers, was found to be significant. (See p. 69.)

HOSPITALIZATION OF MENTAL PATIENTS: A Survey of Existing Legislation—*World Health Organization*, (Columbia University Press) 100 p., paper, \$1.25. The existing legislation of most countries is still inspired by the principles that underlay laws enacted during the nineteenth century.

MICROWAVE SPECTROSCOPY—C. H. Townes and A. L. Schawlow—*McGraw-Hill*, 698 p., illus., \$12.50. Concerned primarily with a relatively new field, the microwave spectroscopy of gases.

MONEY MANAGEMENT: Children's Spending—Leone Ann Heuer—*Household Finance Corp.*,

31 p., illus., paper, 10 cents. Hints on helping young children learn how to use money wisely.

MONTEZUMA CASTLE ARCHAEOLOGY: Part I, Excavations and Conclusions by Earl Jackson and Material Culture by Sallie Pierce Van Valkenburgh with Appendix, Crania From Montezuma Castle and Montezuma Well, by Katherine Bartlett—*Southwestern Monuments Association*, Technical Series, Vol. 3, Part 1, 62 p., illus., paper, \$3.00. Reporting what was found in the excavation of a cliff dwelling in Arizona.

MONTEZUMA CASTLE ARCHAEOLOGY: Part II, Textiles—Kate Peck Kent—*Southwestern Monuments Association*, Technical Series, Vol. 3, Part 2, 102 p., illus., paper, \$2.00. Description of the textiles, sandals, matting, garments and cords found in the excavation of a cliff dwelling in Arizona occupied for some time prior to 1425 A.D.

OBSERVED AND COMPUTED SETTLEMENTS OF STRUCTURES IN CHICAGO—Ralph B. Peck and Mehmet Ensar Uyanik—*University of Illinois Engineering Experiment Station*, Bulletin No. 429, 60 p., illus., paper, 90 cents. Reporting results of a comparison between observed and computed settlements for seven structures in the central business district.

NUTRITION AND HEALTHY GROWTH—Children's Bureau—*Govt. Printing Office*, 35 p., paper, 20 cents. How to tell whether your child is well nourished and how to keep him that way. (See p. 69.)

PROVERBS FOR PLEASURE: Uncommon Sayings Collected, Arranged and Annotated—H. Pullar-Strecker—*Philosophical Library*, 202 p., \$6.00. A book, intended, not for reference, but for enjoyable reading. Proverbs are arranged by subject and wherever possible the nationality is given.

QUANTUM MECHANICS—Leonard I. Schiff—*McGraw-Hill*, 2d ed., 417 p., illus., \$6.50. To explain the physical concepts of quantum mechanics, to describe the mathematical methods involved, and to present illustrative examples of both the ideas and the methods is this book's triple purpose.

REPORT OF THE COMMITTEE ON THE MEASUREMENT OF GEOLOGIC TIME 1953-1954—John Putnam Marble, Chairman—*National Academy of Sciences-National Research Council*, Publication 333, 193 p., mimeographed, paper, \$1.75. Includes an analysis of the various methods for measuring geologic time.

A REVISION OF THE CHIGGERS OF THE SUBGENUS GAHRLIEPIA (ACARINA: TROMBICULIDAE)—Robert Traub and Mary Lou Morrow—*Smithsonian*, 89 p., illus., paper, \$1.00.

THE SCIENCE BOOK OF THE HUMAN BODY—Edith E. Sproul—*Pocket Books*, 232 p., illus., paper, 35 cents. Intended to give the mature adult a better understanding of physiology and anatomy, and of what his own body is and can do.

STATE ACCREDITATION OF HIGH SCHOOLS: Practices and Standards of State Agencies—Grace S. Wright—*Govt. Printing Office*, Office of Education, Bulletin 1955, No. 5, 81 p., paper, 30 cents. This study is intended to make it possible for all states more easily to examine their standards and accreditation practices in the light of what other states are doing.

Five species of *birds*, called dippers, habitually feed on the bottoms of swift mountain streams and literally "fly" under water.

A deceased donor's *eyes*, used for corneal transplants, must be removed within three hours of the donor's death.