GENERAL SCIENCE

New Data Due at Geneva

Most intense bombardment of atomic information world has yet seen is taking place at Geneva. Suggest replacing the atomic peace ship with practical atomic reactors.

See Front Cover

SCIENCE NEWS LETTER *will cover the Geneva conference. Staff members Watson and Helen M. Davis are in Geneva.*

➤ THE WORLD'S most intense bombardment of atomic information is taking place at Geneva.

The possibility of really putting atoms to work for the good of the world will go "critical," to use a term applicable to the atomic reactor, swimming in a purple glow, that the United States flew to Switzerland and installed in the Palace of Nations.

The accent is upon the good, the true and the beautiful, about atomic energy. The conversion of mass into energy is being viewed as an energy source, bringing comfort and riches to lands bereft of such fuels as conventional coal, oil and gas. Exploding atoms are beneficently used to cure disease, create new kinds of crops, preserve food without refrigeration or canning, or trace out mysteries of nature.

The most remarkable thing about the sessions as programmed is the lack of such bad and naughty atomic words, as bomb, either fission (A) or fusion (H), radiation, fallout, secrecy, counter-secrecy, etc. The hopeful design is for peace among the atoms. And for peace among the human controllers of the atoms.

Much is known about the application of atomic energy to the generation of power, uses in research and medicine and the world's stores of raw materials. There are hints of the dawning age of energy resources even beyond what is broadly called atomic.

Nevertheless the facts freely discussed at Geneva are about a decade old. The Smyth report is still the classic. It was issued just after the dropping of atomic bombs on Hiroshima on Aug. 6, 1945, and on Nagasaki on Aug. 9, 1945. Upon the world then there burst a whole new chapter of chemistry, physics and energy. Details have been added since then but actually very few broad fundamentals.

Fear Limits U.S., U.S.S.R.

Fear that other nations will learn what the United States has discovered in the first atomic decade is limiting the U.S. contributions. The Soviet seem to have a reciprocal attitude. Declassification by the Atomic Energy Commission has been proceeding slowly and methodically, with no sudden spurt for the Geneva conference.

Although the formal papers do not appear to afford extremely good prospecting, there are discussion periods that may allow new information to appear. There may be new atomic trump cards up the sleeves of some of the atomic experts.

The world does not know, exactly, what happens in a hydrogen bomb. Suppose the Soviets decide to tell the world. They do know, we are given to understand. Of course, H-bombs are not peaceful and not therefore within the scope of the Geneva conference. But the fusion reactions are basic and highly pertinent.

Send Atom Plants

➤ WITH PRESIDENT EISENHOWER'S atomic peace ship sunk by Congress before its keel was laid, other methods of impressing the world with American development of atomic energy for peaceful purposes will undoubtedly be considered.

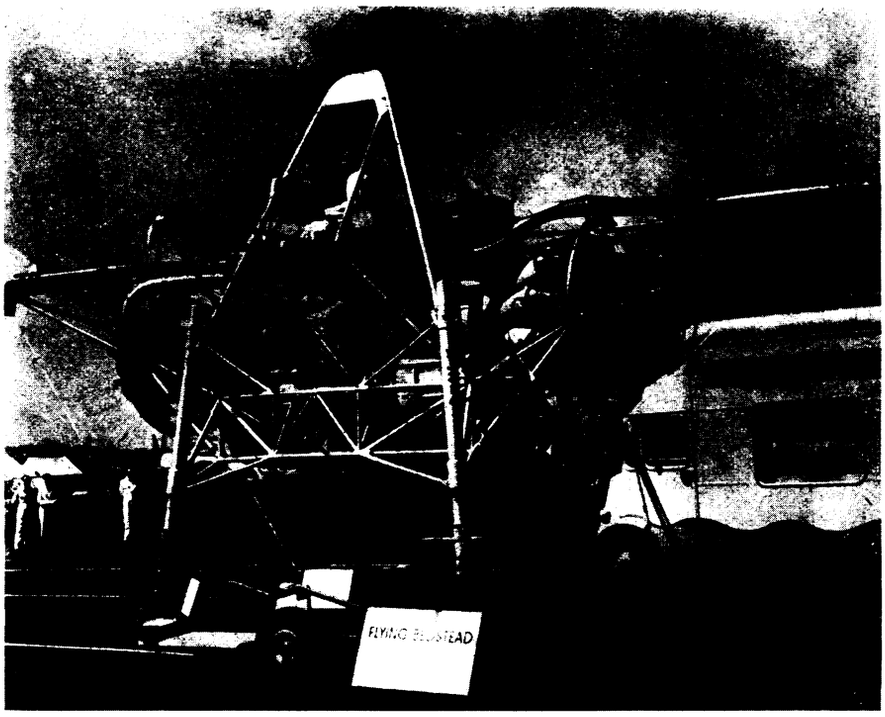
Why should not Uncle Sam send a score or two of practical atomic power plants to remote world areas, generating energy badly needed?

The Geneva atoms-for-peace conference, which the United States proposed to the United Nations, is a major effort for U.S. atoms. The swimming pool nuclear reactor operating in the Palace of Nations grounds demonstrates peaceful use of exploding atoms.

The Atomic Energy Commission is making arrangements to provide about 20 governments with other atomic reactors for research purposes. This will be an important atomic shot-in-the-arm for research in parts of the world where peaceful atoms have not yet flourished.

The great popular promise of atomic energy is new and plentiful energy. In the United States, with relatively ample and low-cost energy from water power, coal, oil and gas, this boon of energy can be overlooked. But in the middle of a desert, or a polar waste, or a teeming, overcrowded Asiatic country, or a tropical jungle—there atomic energy could make life more possible and more pleasant.

A baby atomic power reactor is being born among the more ambitious atomic power plants fashioned to light cities, run submarines and compete with power plants using coal. It is a package power reactor for the Army, a portable reactor that can be hitched to a steam generating plant.



"FLYING BEDSTEAD"—Britain's experimental aircraft, built by Rolls Royce for studying the control of jets entirely by their jet thrust, can go straight up in the air from a horizontal position. The weird-looking plane was shown at the golden jubilee celebrations of the Royal Aircraft Establishment at Farnborough, Britain's main aircraft research center.

The first unit in 1957 will run the motors and lights of the Army's Engineering Research and Development Laboratory at Fort Belvoir, Va., near Washington.

One small charge of fissionable fuel would run the package power reactor at full capacity for 18 months. It would be an ideal power source for a remote arctic installation, like Thule in Greenland, or a Pacific isle, and other places far away from oil and coal supplies.

A couple of dozen of these power package reactors, unwrapped from military secrecy, and spread in places throughout the world that really need them, would be a practical demonstration of American technologic aid in the atomic field.

Powers Nautilus

➤ ATOMIC POWER is actually working. An atomic engine is powering the submarine USS Nautilus. Two prototype submarine power plants are operating, with one of them feeding electricity into commercial lines.

There are five major atomic power reactor projects in the United States, one of them located near Pittsburgh with an output, beginning in 1957, of at least 60,000 kilowatts of useful electricity. This is the type of reactor moderated and cooled by water, using slightly enriched uranium fuel.

Medium scale reactors include a boiling water type at Argonne National Laboratory, a sodium cooled, graphite moderated reactor at Santa Susana, Calif., a new homogeneous type at Oak Ridge National Laboratory, and a fast-breeder reactor at Argonne.

The Argonne boiling water reactor, a model of which is shown on the cover of this week's SCIENCE NEWS LETTER, is scheduled for completion in 1956 at the laboratory, near Chicago. It will produce 20,000 kilowatts of heat for the generation of 5,000 kilowatts of electricity. In the model as photographed, the reactor, turbogenerator and related equipment are located in the steel shell at the left. The service wing, on the right, houses the control console and other operational equipment. The model is on view in Geneva.

The Army has a small portable nuclear powerplant under construction for use at remote locations. Reactors for aircraft are being hatched, secretly.

Four Plants Proposed

Power companies, both commercial and public, have proposed four more atomic plants that total 455,000 kilowatts of electrical capacity.

Soviet Russia claims progress in atomic power plants. England and Canada have power reactors under construction.

There was once great fear that atomic power might be limited for practical use by a scarcity of uranium from which can be separated or created fissionable materials, uranium 235 and plutonium. There is more uranium in the world than first estimated and a continuing supply of raw material for atomic energy seems assured.

Atomic electricity seems likely to compete cost-wise relatively soon with electricity generated from fossil fuels. A recent report showed that, with low fuel costs compensating for high plant costs, overall nuclear energy cost will be 6.7 and 6.8 mills (one-tenth of a cent) per kilowatt-hour against 6.9 mills for the conventional plant. The plants are not built and operating yet and such cost estimates may be tricky.

Hard-boiled industrialists are investing many dollars, as conservative speculations, with Uncle Sam through the Atomic Energy Commission being very generous with financial aid.

Delays, cancellations and postponements have occurred in atomic power plans. Power would have been produced much earlier with a crash program of ignoring the difficulties and dangers and going ahead. In the long run, the haste would probably have delayed solid progress. Unlike the case of bomb building, haste was not necessary. We have power.

Atomic power plants are being built, in part, of technical headaches, moderated by trial and error. Radiation often has unexpected effects. Development is real exploration and timetables are subject to change, but the destination will be reached.

H-Bomb By-Product

➤ THE NEXT GREAT ADVANCE in atomic energy for peaceful uses may be a by-product of the most deadly atomic weapons, the H-bomb.

Suppose, speculation runs, that the H-bomb reaction, fusion of light chemical elements, could be harnessed for power purposes.

The world would have unlimited power. For the raw materials for fusion are plentiful substances compared with the scarce and heavy uranium and thorium out of which fissionable materials of A-bombs are made.

The H-bomb ingredients are forms of hydrogen, the double-weight deuterium and triple-weight tritium and, presumably, lithium, lightest of the metals. Presumably, because no authoritative source has told what happens in the H-bomb.

We know that the H-bomb materials fuse with a tremendous release of energy, transmuting their mass. The trigger is a fission or A-bomb, for extreme heat at great speed is necessary to set it going.

The use of fusion for power hinges on whether light elements can be fused in small quantity without a gigantic explosion. For this to happen some kind of trigger, other than an A-bomb, will be needed.

Perhaps this could be done by exploding a metallic wire with a stiff jolt of electricity. This might give a sufficiently high temperature. The fusion temperature may even be lower than first thought necessary.

Shock waves may also trigger fusion of light elements. When matter at one pressure passes through matter at a very different pressure, shock waves occur and generate high temperatures. Pressure ratios of about 500 correspond to 20 times the velocity of sound, and in the gas argon this would create 16,000 degrees, one scientist figured out. (See SNL, July 30, p. 78.)

This may seem problematical, but it is no more farfetched than predicting the A-bomb in 1939 when uranium fission was discovered.

Science News Letter, August 6, 1955

SCIENCE NEWS LETTER

VOL. 68 AUGUST 6, 1955 NO. 6

The Weekly Summary of Current Science, published every Saturday by SCIENCE SERVICE, Inc., 1719 N St., N. W., Washington 6, D. C., NOrth 7-2255. Edited by WATSON DAVIS.

Subscription rates: 1 yr., $5.50; 2 yrs., $10.00; 3 yrs., $14.50; single copy, 15 cents, more than six months old, 25 cents. No charge for foreign postage.

Change of address: Three weeks notice is required. When ordering a change please state exactly how magazine is now addressed. Your new address should include postal zone number if you have one.

Printed in U. S. A. Entered as second class matter at the post office at Washington, D. C., under the act of March 3, 1879. Acceptance for mailing at the special rate of postage provided for by Sec. 34.40, P. L. and R., 1948 Edition, paragraph (d) (act of February 28, 1925; 39 U. S. Code 283), authorized February 28, 1950. Established in mimeographed form March 19, 1922. Title registered as trademark, U. S. and Canadian Patent Offices. Indexed in Reader's Guide to Periodical Literature, Abridged Guide, and the Engineering Index.

Member Audit Bureau of Circulation. Advertising Representatives: Howland and Howland, Inc., 1 E. 54th St., New York 22, ELdorado 5-5666, and 435 N. Michigan Ave., Chicago 11, SUperior 7-6048.

SCIENCE SERVICE

The Institution for the Popularization of Science organized 1921 as a non-profit corporation.

Board of Trustees — Nominated by the American Association for the Advancement of Science: Kirtley F. Mather, Harvard University; Paul B. Sears, Yale University; Karl Lark-Horovitz, Purdue University. Nominated by the National Academy of Sciences: Edward U. Condon, Berkeley, Calif.; Harlow Shapley, Harvard College Observatory; George W. Corner, Carnegie Institution of Washington. Nominated by the National Research Council: Ross G. Harrison, Yale University; Leonard Carmichael, Smithsonian Institution; Jerome Hunsaker, Massachusetts Institute of Technology. Nominated by the Journalistic Profession: Neil H. Swanson, Ruxton, Md.; O. W. Riegel, Washington and Lee University; Michael A. Gorman, Flint Journal. Nominated by the Scripps Estate: Edward J. Meeman, Memphis Press-Scimitar; John T. O'Rourke, Washington Daily News; Charles E. Scripps, Cincinnati, Ohio.

Officers — President: Leonard Carmichael; Vice President and Chairman of Executive Committee: Charles E. Scripps; Treasurer: O. W. Riegel; Secretary: Watson Davis.

Staff—Director: Watson Davis. Writers: Jane Stafford, Marjorie Van de Water, Ann Ewing, Horace Loftin, Howard Simons, Dorothy Schriver, Helen M. Davis. Science Clubs of America: Joseph H. Kraus, Margaret E. Patterson. Photography: Fremont Davis. Production: Priscilla Howe, Marcia Nelson. Interlingua Division in New York: Alexander Gode, Hugh E. Blair, 80 E. 11th St., GRamercy 3-5410.