

# Tools of India Found in Philippines

Archaeology

## Excavations Show Prehistoric Trade Existed

TRADE relations between India and the Philippine Islands more than two thousand years ago, and a prehistory stretching back to the close of the Old Stone Age, have been revealed by recent excavations on the island of Luzon. So Prof. R. B. Dixon of Harvard University informed the American Philosophical Society at its meeting in Philadelphia this week.

This vast backward extension of Philippine history has been due practically altogether to the work of one man, Prof. H. Otley Beyer, head of the department of anthropology at the University of the Philippines, Prof. Dixon said. Prof. Beyer made his first discovery of prehistoric relics in an excavation for a dam, and since then has found and explored nearly a hundred sites. Since no government funds were made available for the work, Prof. Beyer has been carrying it on at his own expense, and has labored to such good purpose that he now has a collection of scores of thousands of specimens.

Five culture levels are represented in his digs. The uppermost consists of an already-known Chinese stratum, dating back as far as 1000 A. D. Below this is a layer of Iron Age culture, and then two layers of Neolithic remains. The fifth and lowermost layer consists of chipped, unpolished stone implements, and represents either late Old Stone Age or a transition from this to the Neolithic.

The implements in the Iron Age stratum are at least partly of native workmanship, and there are evidences of native smelting of iron. The pattern of the implements, however, is that of iron tools and weapons used in India before the beginning of the Christian era. Further evidence of traffic with India is found in the glass bangles and beads, which are of types from prehistoric finds in the south of India.

### Cancer Control Hinted

THE possibility of the long-sought control of cancer is suggested by a theory of growth promotion and inhibition by means of organic sulphur compounds, which

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The oldest scientific society in the United States, the American Philosophical Society, held its annual meeting this week. Gathering in the historic hall of the society on Independence Square in Philadelphia, the members discussed topics of interest in many different scientific fields.

The American Philosophical Society was founded by Benjamin Franklin in 1777, and has counted on its roster almost all the leading scientists that the United States has produced.

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was explained to the meeting by Dr. Frederick S. Hammett of the Lankenau Hospital of Philadelphia. Dr. Hammett did not advance any claim to having found a cure for cancer, but he did state that transplantable tumorous growths in mice had been caused to diminish, and in at least one case to disappear, by the application of an organic compound containing partially oxidized sulphur.

Dr. Hammett's experiments have had a much more comprehensive aim than an effort at the solution of the cancer problem. They have been endeavoring to discover the chemical secret of all growth by cell multiplication. Some time ago he stated that he had found the stimulus to cell division in the chemical group known as sulphhydryl, consisting of one atom of sulfur and one of hydrogen, which attaches itself to a large variety of chemical bases, including many organic and living compounds. By applying various substances containing this sulphhydryl group he succeeded in stimulating growth in various plant and animal tissues.

A practical application of this discovery has already been made in the medical field, Dr. Hammett stated. One of his colleagues has tried a sulphhydryl compound on obstinate open wounds and sores of various types, and the resulting rapid growth of new tissue has brought about the cure of a number of long-standing cases.

After he had satisfied himself that growth by cell multiplication is stimulated by sulphhydryl, Dr. Hammett undertook to find out why growth is checked under natural conditions. Since oxidation processes go on rapidly in growing tissues, it seemed natural to infer that the sulphhydryl compounds were oxidized,

and that as they added more and more oxygen to themselves they lost the power to stimulate cell division. He applied various partly-oxidized sulfur compounds to growing plant and animal tissues, as he had originally applied sulphhydryl compounds, and found that the oxidized substances did cause a slowing down of growth. His successful experiments on the mouse tumors followed.

### Twin Schools

AN experimental school for the testing of new methods in teaching, to be attended only by half-pairs of identical twins, while the other halves of the pairs attend a standard school as "controls," was one of the suggestions made by Dr. A. F. Blakeslee of the Carnegie Station for Experimental Evolution, Cold Spring Harbor, N. Y.

One of the difficulties of finding out anything about human beings by experimental methods, Dr. Blakeslee explained, is the usual lack of anything to check by. The chemist has his carefully purified chemicals, the botanist can take two slips off the same plant and use one of them as a "control," the zoologist can breed out irregularities in the pedigree of his stock by several generations of brother-and-sister matings. But human beings have to be taken as one finds them.

The nearest approach to control material we can get in educational or other experiments involving human beings is furnished by identical twins. These are twins who result from the division of the same original cell; they are always very similar in appearance and always of the same sex. It can be assumed therefore that if one child of such a pair comes to differ from the other to any noticeable extent it is probably due to some influence of the environment, to which one twin was subject while the other was not.

Dr. Blakeslee's suggestion is that we take advantage of this fact, by separating the usually inseparable twins for part or all of each school day. Then after a time we could judge by any differences that might develop between them what the inherent advantages or disadvantages of any proposed (Turn to page 262)

# Annihilation of Matter Keeps Sun Going

*Astrophysics*

## Light "Particles" Stream From Broken Atoms

**A**NNIHILATION of matter in the sun to form the energy which is radiated as heat and light is the process that keeps the sun going. Dr. C. G. Abbot, secretary of the Smithsonian Institution, said in a Science Service radio talk over the Columbia Broadcasting System.

"What supplies the sun itself with such an enormous output of energy?" Dr. Abbot asked, and answered: "Astronomers and physicists now think that the sun and all the stars are gradually consuming. I do not mean that they are burning up as coal is burned. When coal is burned it takes on oxygen, and the product in carbonic acid gas is nearly four times as heavy as the coal that is burned. Nothing like this takes place in the sun. The temperature there is so tremendous that water would turn to steam, the steam into oxygen and hydrogen, and the atoms of oxygen and hydrogen largely into electrons and protons, and all this with explo-

sive violence if any water at all could ever reach the sun.

"All chemical compounds are thus broken up in that fierce heat. We have nothing on earth so hot. Iron melted in a blast furnace would look like a black spot against the sun, and even the arc light would seem a dull red glow against such transcendent brilliance as the sun's surface. If, then, the sun is much too hot to burn, even on its surface, and perhaps ten thousands times hotter still at its center, what do we mean by that consuming that gives out its tremendous radiant energy? We mean nothing less than the annihilation of the solar substance. Take hydrogen for example. Its atom, so far as we know, consists of nothing but a separation of two units of electricity, one positive and one negative, kept apart by some tremendous energy of motion. We suppose that in the center of the sun, under prodigious pressure and exalted temperature, the two elec-

tricies may sometimes be forced together. When thus the atom ceases to exist, the energy that formerly forced its two units of electricity apart appears as radiation, and journeys outward into space."

Dr. Abbot also described new researches on the relation of plant growth to light.

"At the Smithsonian Institution we are making studies about this fascinating subject," he said. "We are growing plants out of jars of water containing suitable chemical plant foods. They stand in closed chambers where sunlight can be imitated by electric lights. We control the color of the light and seek to know just how efficient the different colored rays are to produce plant growth. Thus, without sight of sun or feel of earth, our plants are grown under exactly measured conditions. This will bring new knowledge of exactly what is necessary to make plants grow in natural surroundings. Perhaps improved varieties of useful plants may result from such studies."

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### Philosophical Society—Continued

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educational methods might be. At present, having no such method of checking, we can only argue about it.

Dr. Blakeslee stated that a preliminary survey of the school population in New York City indicates that there is a sufficient number of identical twins to fill a special "twin school," if the funds can be found to operate it. He suggested that for such a double school it would be desirable to obtain pairs of teachers who are themselves identical twins, so that the "control" method might be extended as far as possible.

### *Ancestry of Lowest Fish*

**A** FOSSIL "missing link" with an existing creature that looks like a missing link itself was described by Dr. W. B. Scott, professor of geology at Princeton University.

One of the most puzzling of existing animal forms, Dr. Scott said, is the hagfish or lamprey-eel. In spite of the piscine suggestion in its name it is not really a fish but a sort of remote relation of the fishes, and a very poor relation at that. It has no eyes, no scales, no fins, no jaws,

not even any bones. Its mouth is a mere sucking circle, armed with sharp horny teeth. One of the world's leading authorities on fishes once expressed the opinion that it had no long ancestry, but reached its present low estate in comparatively recent times through degenerative evolution.

But fossils recently discovered in Norway and studied by Dr. Scott now produce evidence that these humble fishlike creatures have a lineage as ancient as that of any higher animal. The Norwegian stones from Silurian formations, much older than the Coal Age, show a creature possessing many of the characters of a modern lamprey-eel, but decidedly more primitive in structure.

Interestingly enough, however, these ancient creatures had well-developed scales, as well as incipient traces of fins. But there is no evidence that they had any bones, and they had no teeth. The pineal gland, which was once a third eye, opened to the surface on the middle line of the head, whereas in the modern lamprey-eel it is buried under the skin and other tissues.

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A centipede usually has about twenty legs, although its name indicates that it has a hundred.

It has been found that salmon contains the vitamin that prevents the disease of pellagra.

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