



### HOLDS IMPORTANT SECRET

*The sun, most important of all the stars to us earth-dwellers, is shown here with a large crop of sunspots in a photograph taken at the U. S. Naval Observatory.*

they consist are themselves torn apart. The atomic hearts or nuclei are rushing around at tremendous speeds, so are the loose electrons, and they are continually colliding with each other.

Understanding this, astronomers have now come to a satisfactory explanation of how the sun and other stars keep up their terrific broadcasting of energy. The sun's radiation, in a single minute, could melt a 40-foot shell of ice completely surrounding it!

In 1929, Robert Atkinson and an associate, Fritz Houtermans, working with him in Berlin, demonstrated that the speed of the atomic fragments in the stars, and the violence with which they hit each other would break up the atoms, with the liberation of energy. They did this with the use of a formula that had been worked out the previous year in Russia by Dr. George Gamow, who is now at George Washington University.

Not until 1938, however, were the actual atomic nuclei involved finally identified. Independently, Dr. Carl von Weizsacker, in Germany, and Dr. Hans A. Bethe, of Cornell University, found a series of changes which yielded almost exactly the right amount of energy. All other possible reactions gave either too much or too little.

This is between hydrogen and carbon. A number of steps are involved. The nuclei of hydrogen atoms strike the carbon atoms, and transmute them into

an isotope of nitrogen. This is unstable and quickly decomposes into carbon, but not the same isotope with which it started. Another hydrogen nucleus comes along, the carbon is changed back to nitrogen, this time of the ordinary variety, with atomic weight 14. This is hit by still another hydrogen nucleus, and changed to a very uncommon variety of oxygen. This quickly decomposes into a third isotope of nitrogen, of atomic weight 15, which makes up about one-seventh of the nitrogen in the air.

Then the fourth, and last, hydrogen nucleus happens along. There is a magical change, for now we have helium, gas used for inflating airships, and carbon of atomic weight 12, with which we began! The carbon is now ready to start over again. Or, if we like, we can start the cycle with the nitrogen, then we come back to it. But the hydrogen with which we started is gone, replaced by helium, the "ashes." In the process, various rays associated with radium are given off at different stages, as well as large amounts of energy. This output is very close to the actual rate observed for the sun, while all the other reactions that Dr. Bethe studied are far different. Thus we have good reason for believing that, at last, we have a pretty good idea of what is happening in the sun.

An interesting feature of this work is that it gives a clue to the future of the sun. The only element that is used up is hydrogen, and the sun has enough

of this to last some 35,000,000,000 years, using it at the present rate!

The structure of the sun is such that this process tends to regulate itself. The flow of energy outwards from the center produces a pressure which balances the gravitational pull inwards and keeps it in a stable condition. If the production of energy should increase, added radiation pressure would increase the size, the gases would expand, their temperature would be lowered, and the output of energy would decrease. Reduction in the output would work oppositely. The sun would contract, pressure and temperature would increase, and normal production would be restored.

So atomic energy has been achieved, and that ages and ages ago. It is going on all the time—in the sun and the other stars. From astronomical studies, we may be better able to understand it, and to put it to work for ourselves.

*Science News Letter, February 15, 1941*

### EVOLUTION

## Ancient African Ape Had Hands Like Human's

**H**ANDS like those of a human being, used little or not at all in walking on all fours, belonged to the puzzling man-like ape of Ice Age date, known as *Plesianthropus transvaalensis*, Dr. Robert Broom of the Transvaal Museum, Pretoria, South Africa, has concluded after examining the principal wrist-bone of one of these animals, found recently in the now classic cave site at Sterkfontein. Dr. Broom has sent an illustrated report on the find to the British weekly journal, *Nature*, copies of which are expected in the United States shortly.

The bone was compared with analogous wrist bones of three genera of apes—gorilla, chimpanzee and baboon—as well as with similar bones from the primitive African race of Bushmen. The fossil was decidedly more like the human bones than it was like those of any of the apes, indicating strong human resemblances in form and therefore, presumably, in function.

Dr. Broom holds that this is not to be particularly wondered at, since it is already known that this extinct ape had teeth very nearly like those of men. The bone was found in the same cave, and close to the same spot, where the lower jawbone of a female of the same species was discovered a short time ago.

Another strong resemblance to a human condition is shown in the sinus structure of *Plesianthropus*, Dr. Broom

has discovered. One lobe of the maxillary antrum bears the same relation to the second molar tooth that is found in the human jaw, and is different from the structures found in ape jaws.

These extinct, extremely man-like apes of South Africa created something of a sensation when their skulls were first discovered, a few years ago. They cannot

be considered as in any way ancestral to man, because when they lived there were already fully developed, distinctly human races elsewhere in the world. They more probably represent a side-branch of the ancient family tree, descended from the hypothetical but still undiscovered, common ancestor of apes and man.

*Science News Letter, February 15, 1941*

#### ANTHROPOLOGY

## Leading American Scientists Have Heads Not "Nordic"

### Academicians Are Full-Grown and Sturdy, Middle-Aged Or Elderly, Have Wide Heads and Dark Hair if Any

**M**YTHS of "Nordic superiority" fare ill at the hands of Dr. Ales Hrdlicka, eminent physical anthropologist of the Smithsonian Institution, who has just completed a study of the heads of 150 of America's leading scientists. Far from being long-headed blonds, Dr. Hrdlicka's group of outstanding American scientists tend to be wide-headed, and their hair (so far as they have any left that isn't gray) is decidedly dark.

The group included in the study were chosen from the membership of the National Academy of Sciences. This body, sometimes referred to as the Senate of American science, elects to its membership only persons of proved accomplishment and reputation in the various fields of science. Naturally, most of its membership is middle-aged and elderly—few men less than fifty years old are elected.

High average age of the members accounts in part for the predominantly

dark hair color, Dr. Hrdlicka explains. Everyone's hair grows darker as he grows older. It also explains the qualification of his statement, that a high proportion of the Academy members have (or had) dark hair.

Fifty members of the group studied were of foreign birth or immigrant ancestry. The remaining 100 were "Old Americans," that is, of families who have been three generations or longer in this country. These "Old American" scientists tend to have larger and wider heads and darker hair than the average "Old American" men in the general population. They also have decidedly less prominent cheekbones.

Another myth that suffers from this study is that of the "highbrow." Eminent scientists don't average more prominent foreheads than do other men, the measurements show. Neither do scientific leaders have massive heads on stoop-shouldered, pindling bodies: the general physique of Dr. Hrdlicka's 150 is full-grown and sturdy. This, it is pointed out, is largely a matter of nutrition. Men with their brains and training get good jobs and keep them.

Seven per cent of the group have decidedly back-sloping foreheads—another traditional "sure sign" of inferior intellect. This, Dr. Hrdlicka explains, has nothing to do with the brain content of the skull. A sloping forehead is usually due to larger-than-ordinary sinuses over the eyebrows, giving a wider base rather than a narrower top. Even when the slope is due to other causes, however, it does not necessarily mean any inferiority of the brain.

One member of the Academy, says Dr. Hrdlicka, has the head of a Stone Age

man. This does not mean, however, that he is a beetle-browed Neandertaler—far from it. His head is like that of the Aurignacian people, who left remarkable paintings and sculptures in the caves of southern Europe. Aurignacian men had larger heads and bigger brains than moderns. The type still crops up occasionally, Dr. Hrdlicka states, in Scandinavia and among certain groups of American Indians. They may be considered a survival of, or perhaps a reversion to, the earlier type of our common ancestry.

*Science News Letter, February 15, 1941*

#### ASTRONOMY

## Jupiter Passes Saturn For Last Time Until 1961

**F**OR many months the two planets, Jupiter and Saturn have been shining brightly in the southern and now the southwestern evening sky, with Jupiter the more brilliant. After Jupiter passes Saturn, on Feb. 20, they will not be together again until the early part of 1961.

This has been determined by Dr. Samuel Herrick, Jr., of the astronomy department of the University of California at Los Angeles, who announces the results of his calculations in the current leaflet of the Astronomical Society of the Pacific.

Jupiter moves around the sun every 5.20 years, at a speed of 8 miles per second. Saturn, farther out, takes 29.46 years to encircle its orbit, with a speed of about 6 miles per second. About every 20 years Jupiter overtakes Saturn in their never-ending race.

Because the earth is in motion, however, the paths of the planets are quite complicated. Our planet travels at 18.5 miles per second. Regularly, therefore, we overtake the outer ones, and as we go past they seem to go backwards for a time. Astronomers call this "retrograde" motion. A similar retrograde movement of a freight train is observed by a passenger on an express train that passes it.

Last August, Jupiter passed Saturn. Then the two planets began their retrograde movement; there was another conjunction in October. Now both are again moving to the east, or forward, and the final passing of the series happens on Feb. 20 at 11:00 a.m., Pacific standard time (2:00 p.m. E.S.T.). Such a passing three times in a row is called a "triple conjunction."

When Jupiter passes Saturn in 1961, says Dr. Herrick, this will not occur, for the backward motions will not oc-

## Let us do it

When you want a book on science, save yourself the trouble of shopping. Let us get it for you. We will gladly obtain any American book or magazine in print and pay postage in the United States. Just send your check or money order to cover retail price (\$5 if price is unknown, change to be returned to you). When publications are free, send 10c for handling. Address:

*Book Department*

SCIENCE NEWS LETTER

2101 Constitution Ave. Washington, D. C.