ASK THE SCIENTIST

If you have a question to ask the scientists, mail it to the New York Press Association, The Castle, Syracuse, 10, New York. The Science Board of the Radio Workshop at Syracuse University will answer each week in the Andover News those questions considered most interesting and timely.

Question 1. Is tough meat always a sign that the animal was old when killed?

ANSWER. A number of things determine the degree of toughness or tenderness of meat; some of these are age of the animal from which the meat was obtained, the amount of muscular work performed by the piece of meat in question, and the quantity and quality of food available to the animal before it was slaughtered.

The muscle tissue which has been most concerned in the muscular work which the animal has performed is less tender than that which has been less used. All muscle consists of tiny fibers which under the microscope look like small tubes. These fibers are tender in younger animals and in those parts of older animals in which there has been little muscular strain. In old animals, and in those parts of the body where there has been much muscular action, the neck and legs, for example, the muscle fibers are tough and hard.

But there is another point of even greater importance. The fibers of all muscles are bound together in bundles and groups of bundles by a thin membrane called connective tissue. This membrane, if heated in water or steam, is converted into gelatin. The process goes quickly if the meat is young, more slowly if it is old.

In animals that are fattened over a period of time, that is, not forced or hurried, much of the fat is stored in this connective tissue between muscle fibers and this makes for tenderness. If the fattening process is hurried, the bulk of the fat is deposited around the larger muscles, much of it just under the skin, and as a consequence has little effect on the fibers of deeper-lying connective tissue.

In a study of factors which influence tenderness it was shown that the toughness or tenderness of the meat fibers is a matter of the location of the cut. The fibers from an exterior cut such as the flank were almost two and a half times as tough as those from an interior cut such as the tenderloin.

Nutritive value and flavor are in no way related to tenderness. Tougher, and therefore, cheaper cuts are just as nutritious and flavorful as tender and more expensive cuts.—Prof. Ralph King, forest zoologist.

Question 2. Just what produces the intense heat of the sun and stars? I have read of flames of hydrogen thousands of miles high on the sun. Do these produce heat?

ANSWER. No, the sun isn't on fire, at least not in the same sense that the gas or coal in our furnace is on fire.

Studies made with modern atom smashers have recently given us a clue as to what actually happens to produce this heat in the sun and in the stars, and we can even predict their probable life.

In the atom smasher, which is a scientific tool in use in many laboratories, hydrogen atoms are shot like bullets at other atoms. These hydrogen bullets enter the heart or nucleus of the target atom where they produce a new but very unstable atom. This new atom then explodes to form still another kind of atom and much heat is evolved. These processes are now well understood by scientists.

At the terrific temperatures within the sun (some 20 million degrees) hydrogen atoms move at high speeds and can act as projectiles or bullets in the same manner as they do in the atom-smasher. On the sun these hydrogen projectiles enter the nucleus of carbon atoms and by a series of nuclear changes hydrogen is finally transformed into helium. The net result then is that the hydrogen in the stars is transformed into helium with the evolution of heat. A little over a pound (1.008 pounds to be exact) of hydrogen is required to produce one pound of helium, which means that there is a net loss of .008 of a pound involved in the process. This loss is about the weight of one teaspoonful of water.

The laws of nature prohibit the loss or destruction of anything in the universe so that this loss in weight must reappear as something. It reappears as heat. The weight associated with one teaspoonful of water is equivalent, in heat energy, to that produced by burning about 90 tons of coal.

In other words, for every pound of weight lost in changing hydrogen to helium, as much heat is produced as would be obtained by burning 12,000 tons of coal. At the present rate at which this transformation takes place on the sun, all of the hydrogen will disappear in about 30 billion years and the life of the sun will end.— Dr. Aden King, chemist.

He's Had Practice

A lady was entertaning her friend's little son.

"Are you sure yau can cut your meat?"

"Oh, yes," he replied, "we often have it as tough as this at home."

NOTICE

The Empire Gas and Fuel Company, Limited of Wellsville, New York, on August 23, 1945, filed with the Public Service Commission at Albany, New York, the rate schedules shown below to be effective October 1, 1945. These constitute an extension of rates now in effect and will not result in any change in rates for any customers.

CLASSIFICATION NO. 2

	Gross Rate per MCF	Discount per MCF	Net Rate per MCF
First 3,000 cubic feet per month	$ .70	$ .05	$ .65
Next 47,000 cubic feet per month	.47	.02	.45
Over 50,000 cubic feet per month	.41	.01	.40
Minimum Monthly bill	.70	.05	.65

Special Provision:

This service classification expires on September 30, 1946.

CLASSIFICATION NO. 3

First 3,000 cubic feet per month	$70	$ .05	$ .65
Next 47,000 cubic feet per month	.47	.02	.45
Next 50,000 cubic feet per month	.41	.01	.40
Over 100,000 cubic feet per month	.30	None	.30
Minimum charge per meter per month	.70	.05	.65

Special Provision:

This service classification expires on December 31, 1945. Available for commercial and industrial fuel, lighting and power, for twelve months or longer continuous service at one location, subject to prior use of available gas by domestic consumers.