

the muscles vanishes within five minutes, but is restored quickly in recovery. Blood flow in the muscles diminishes markedly during the dive, but apparently the brain's supply of blood is not diminished. Apparently the muscles get along without new oxygen during the diving pe-

riod, burning part of their substance down to lactic acid, which rapidly passes into the blood as soon as the animal emerges and begins breathing air again.

Associated with Dr. Laurence in the research were Dr. P. F. Scholander and Dr. S. W. Grinnell.

*Science News Letter, November 2, 1940*

## METALLURGY

## Grain Size Affects Degree to Which Steel Can Be Hardened

**Even Among Steels of Similar Chemical Composition, Larger Grains Are Found To Give Harder Metal**

**N**EW studies of the factors which affect the degree to which steel can be hardened, important in preparing steel for armor and munitions, as well as for many industrial uses, were described to the American Society for Metals, meeting in connection with the National Metal Congress and Exposition in Cleveland. These researches were made by Dr. M. A. Grossman, director of research, and R. L. Stephenson, metallurgist, of the Carnegie-Illinois Steel Corporation.

The chemical composition of a steel has a lot to do with the extent to which

it can be hardened, but it has been found that even those of similar composition may have different hardenabilities. This is determined by the size of the grains of which it is formed.

In their researches, Dr. Grossman and Mr. Stephenson found that larger grains gave a harder steel. They stated also "that the greater the hardenability of the steel, due to its chemical composition, the more was the hardenability affected by a change in grain size." The hardenability can be increased as much as 50% by changing grain size.

They presented to the meeting tables

showing these relations in various kinds of steel. This information, it is expected, will prove useful in making possible a more accurately controlled degree of hardening of steel in various uses.

*Science News Letter, November 2, 1940*

## Stronger Stainless Steels

**A**BILITY of stainless steel used in airplanes to absorb vibrations, such as those from the engines, is less the stronger it is. This was reported by R. M. Brick and Arthur Phillips, of the Hammond Laboratory of Yale University, to the meeting.

However, both aluminum and stainless steel have their respective advantages, and the experimenters drew no conclusions as to whether or not one might supplant the other. They were concerned both with the fatigue of a metal, that is, the number of times it can be bent; and the damping, or vibration-absorbing power. The latter is very important in an airplane, because, unlike machinery on the ground, there is no foundation to absorb the vibration. This must be done by the structure of the airplane itself.

Surface effect, they find, is a considerable factor. Some types of aluminum alloy develop surface cracks under heavy vibration. Stainless steel, also, may have its fatigue strength impaired by surface effects. They point out that a finely polished surface, free from any channels made by the acid used in the final stages of manufacture, is important.

*Science News Letter, November 2, 1940*

## Chafing Affects Strength

**C**HAFING between metal machinery parts, often neglected in past tests of metal parts, is an important factor in constructing airplanes and other kinds of machinery, Dr. George Sachs, assistant professor of metallurgy, and Peter Stefan, research assistant, at the Case School of Applied Science told the American Society for Metals.

The rubbing action between two closely fitted machine parts, they said, adds greatly to the total stress to which they are subjected. Examples are found in press fits, axle seats, propellor hubs and other important machine assemblies. If chafing is not considered, a simple test under static conditions of the material used may give a false idea of its strength. Even if a part's normal strength under continued stress seems ample, the



### RESPONSIBLE

*These three men were responsible for the design and erection of the new Durez synthetic phenol plant. They are G. M. Loomis, R. M. Crawford and Dr. W. Prahl. The latter, while connected with the Raschig company in Germany, was one of the original inventors of the process.*

chafing effect may mean that it is worked close to or even beyond its safe limit.

The metallurgists find that under these conditions cast steels and alloys of aluminum may really be superior to wrought metal parts, even though in ordinary testing the latter show greater resistance to fatigue.

*Science News Letter, November 2, 1940*

## Bombardment for Strength

**I**NCREASED strength of steel parts of airplane motors by bombardment with tiny hard steel balls and so hammering the surface into an extremely hard and smooth finish was promised by F. P. Zimmerli, chief engineer of the Barnes-Gibson-Raymond division of Associated Spring Corporation.

The process is called "shot blasting," and has been used for some years on automobile springs, greatly increasing their life. Springs which used to fail after 50,000 bends now are made to function more than a million and a half times without breaking. Not only does this make better springs, but the steel which might have been needed for replacements is saved for other important uses.

Mr. Zimmerli stated that he saw no reason why connecting rods and other airplane motor parts which operate under heavy stress could not be shot blasted instead of being ground and polished all over. This, he indicated, would give increased strength and also, perhaps, make possible the use of less steel in their manufacture. Aluminum alloys, phosphor bronze, nickel steel, and other ferrous alloys can also be adapted to the process, he stated.

*Science News Letter, November 2, 1940*

When *eelgrass* along the Atlantic coasts died out swiftly and almost completely for unknown reasons about 10 years ago, the migratory waterfowl called *brant* also were nearly wiped out, because this grass is their favorite food.

## ● RADIO

Dr. George B. Watkins, director of research of Libbey-Owens-Ford Glass Co. will talk on the "Modern Automobile's Invisible Wall of Safety" as guest scientist on "Adventures in Science" with Watson Davis, director of Science Service, over the coast to coast network of the Columbia Broadcasting System, Thursday, Nov. 7, 3:45 p.m. EST, 2:45 CST, 1:45 MST, 12:45 PST.

Listen in on your local station. Listen in each Thursday.

### MEDICINE

## Seven-Fold Medical Exam Awaits Draftees for Army

**N**O, YOUNG fellow, you're not in the Army yet. Even after your number comes up, you'll still have a seven-fold screening of medical tests to go through, before you're considered a worthy recipient of one of those nice, new Garand rifles. It takes a healthy man to be a soldier.

Here are the medical steps that must be climbed by those called for service. They are outlined in the *Journal of the American Medical Association* (Oct. 19):

1. Examination of urine, and when required, of sputum and other body fluids.
2. Blood test for syphilis.
3. Eye-ear-nose-throat and dental examinations.
4. Measurements of height, weight, chest; examination of feet, bones and joints.
5. General surgical examination.
6. Examination of heart and lungs.
7. Neuropsychiatric examination, to

weed out the obviously unfit from mental and emotional standpoints.

After these more or less routine examinations, there may still be X-ray, laboratory and other check-ups on individuals who seem to be special cases.

These examinations, the *Journal* states, will be made after draftees have been certified by their local boards and sent on to the medical induction boards.

These boards will serve in connection with the induction stations, where draftees report for assignment to duty. Induction stations will do the same work for the new army that enlistment stations perform for the volunteer service.

Specialists volunteering for the service will make up the medical induction boards. Each board will consist of three internists, one general surgeon, one foot specialist, two eye specialists, one ear-nose-throat specialist, one neuropsychiatrist, one clinical pathologist and one dentist.

*Science News Letter, November 2, 1940*

### MEDICINE

## Heart Disease More Frequent Among Tobacco Smokers

**H**EART DISEASE occurs more often among tobacco smokers than among non-smokers under 50 years old, though smoking may not necessarily be a cause of heart disease, Dr. John P. English, Dr. Frederick A. Willius and Dr. Joseph Berkson, of the Mayo Clinic and Foundation, announce as a result of a study of several thousand smokers, non-smokers, and patients with and without heart disease.

Without assuming that tobacco smoking is a cause of heart disease, the Mayo Clinic physicians, in a report to the American Medical Association, suggest the possibility that smoking is "a precipitating influence in the earlier development of coronary disease."

"It is perfectly true," Dr. Willius agrees with other physicians, "that many other factors enter into the problem—heredity, our manner of doing things, temperament and so on."

Among 1,000 patients with heart disease there were 698 smokers, contrasted with 663 smokers among 1,000 persons without heart disease. Among 187 heart disease patients between the ages of 40 and 49 years there were 149 smokers, contrasted with 187 smokers among 302 persons between 40 and 49 years who had no heart disease.

The smoking of tobacco, the physicians comment, probably has a more profound effect on younger persons, owing to the existence of relatively normal heart and blood vessels, influencing perhaps the earlier development of heart disease. In the older age groups in which artery changes are prominent regardless of outside influences such as smoking, the possible harmful effects of tobacco smoke are less evident than the other factors concerned in the production of artery disease.

*Science News Letter, November 2, 1940*