amplitude. When near one end of the path the length of the pendulum is increased, and when near the middle of the path the length is decreased. In the course of a few swings the amplitude can be very greatly increased. The process can also be reversed and the motion of the pendulum very quickly damped.

The increase in the energy of the pendulum as its amplitude increases comes from the work done in lifting the bob when near the middle of its path. This is because a given change in the length of the pendulum involves a greater vertical displacement when the pendulum is nearly vertical than when it is much inclined to the vertical.

ARTHUR TABER JONES

SMITH COLLEGE,

A QUICK METHOD OF ELIMINATING SEED-BORNE ORGANISMS OF GRAIN

THE seed-borne diseases of grain have proved difficult to definitely eliminate from the seed. In connection with studies of hot formaldehyde as a fungicide for potato diseases it was tried for wheat scab. It was soon apparent that holding the grain in a formaldehyde solution at 50° C. as for potato scab was ineffective in killing the fungus or destructive to the viability of the seed. In order to overcome these difficulties the grain was suspended just above the formaldehyde solution one part in 240 parts of water and the temperature was raised to 98 to 99° C. and the time of exposure shortened to twenty seconds. Under these conditions all fungi in or on the seed were killed and in the majority of cases the bacteria were also eliminated. This momentary treatment did not injure the germinating capacity of the seed. The fungus flora of wheat seeds were destroyed in twenty seconds while the germinating capacity of the grain was not injured in forty seconds and only slightly at fifty. It is believed this method can be made practical for the control of scab and other seed borne diseases of grain.

I. E. MELHUS,
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IOWA EXPERIMENT STATION,
AMES, IOWA

SCIENTIFIC BOOKS

The Grand Fleet, 1914–1916: Its Creation, Development and Work. By Admiral VISCOUNT JELLICOE of Scapa. New York, Geo. H. Doran Co. 1919.

One hardly expects a critical review of a book of this character except in military journals. Yet, this book is a plain, unvarnished narrative of the meeting in battle of the two great fleets of Great Britain and Germany. Jutland was the culmination of a struggle for supremacy on the seas and back of that for world domination. It was essentially a tryout of scientific methods of annihilation as developed and adopted by the two leading nations of the world. The book might well carry as a sub-title "Science in Naval Warfare up to 1916." And therefore brief comment upon the scientific methods of the opponents is not out of place here, for we all know *now* that professional military and naval men have to lean and lean heavily upon non-official scientific men.

The battle of Jutland as described in this book reminds one of a Homeric conflict, for just when some great captain had closed with his antagonist, the watching gods, disguised as mists, fogs and poor visibility intervened and separated the fighters. Much as we would like to compliment the British, the palm for preparation and scientific attainment must go to the Germans. The British had more ships and more guns; but the Germans had better range finders, better telescopic sights, better mine fields, better torpedoes, better submarines and more of them, better overhead observation facilities and a Zeppelin or two.

The Grand Fleet (British) appears to have made use of a single seaplane which flew very low, yet whose observations as Vice Admiral Beatty says, were "of distinct value."

The German battleships were of greater displacement than contemporary British ships and carried a greater weight of armor. Nine of the British dreadnaughts had protection to the main deck only, while all of the German dreadnaughts had side armor to the upper deck. The Germans had a delay action fuse