SCIENTIFIC AND SANITARY.

Sir Benjamin Baker has recently shown that a crack or nick on the surface or edge of a bar of steel does not always indicate its liability to fail by the gradual spreading of the nick and a probable breaking under a very much smaller load than a sound bar.

Rats are natives of Asia and their raids westward belong to comparative modern times. From the fact that it is not mentioned by any of the early Europeans, it is surmised that it was unknown west of the Ganges in ancient times. The black rat first came from Asia to Europe in the sixteenth century—along with the plague—and was first known as the "Graveyard Spectre," because it preyed on the flesh of those who died during that awful visitation. —*Pittsburg Dispatch.*

Falling Bodies.—Some interesting experiments on falling bodies and the resistance of the air have been recently made by MM. L. Cailletet and E. Colardeau at the Eiffel Tower, and the results have been communicated to the Paris Academy of Science. Spheres of metal were allowed to fall from the second platform of the tower, and the exact time of falling certain distances was measured to the hundredth of a second by an electric chronograph. Care was taken to eliminate any source of error, and the authors find (1) that the resistance of the air is proportional to the area of the resisting surface, but independent of its form; (2) that it is proportional to the square of the velocity is not strictly true, as the resistance increased rather more rapidly; (3) the amount of fall after which the velocity of the weights employed became uniform ranged from sixty to 100 metres.—*English Mechanic.*

Neither a piano nor an organ should be left open at night or habitually when not in use. The changes of temperature are very hurtful to the tone of any instrument, and especially the gathering of dampness, which not only interferes with the tone and quality of the strings and reeds, but is very likely seriously to affect the works. Pianos in particular should be kept in as even a temperature as possible, since they are much affected by alterations of heat and cold, dryness and moisture; if thus exposed they require very frequent tuning, and are not satisfactory in action or tone. Care is also equally desirable in regard to other stringed instruments—the violin family, banjos, guitars, and the like. In all of these the strings are much affected by exposure to dampness and great changes of temperature. All fine instruments should be habitually kept in cases lined with baize or flannel. —*New York Courier.*

When seeds are at their best, and the conditions for germination good, it is surprising how long a way a little weight will go. As many as 5,000 plants have been obtained from a single ounce of onion seed. *Meehan's Monthly.*

The centrifugal force developed by the earth's rotation tends to throw bodies off its surface as a stone is propelled by a sling, and in consequence of this fact 1-1,-298th of the weight of every particle of matter lying along the equator is employed in keeping it on the earth.

After all, science can scarcely explain the why of anything. It merely points out the order in which natural processes occur. Preyer holds that sleep is caused by the products of decomposition, lactic acid and creatin taking up the oxygen in the blood. The functions of the gray matter of the cortex cannot be exercised without a plenteous supply of arterial blood any more than the zinc and copper of a voltaic pile will evolve electricity without sulphuric acid. Thus the blood conveys a stimulus or imparts a capacity to the nerve tissues during waking, while during sleep it has a separate and distinct function—that of repairing waste. Apparently these two processes cannot go on in the brain at once, or at least only to a degree too limited to prevent a speedy exhaustion of the vital powers if sleep be withheld.—*British Medical Journal.*

In order to ensure some safety in ropes used for scaffolding purposes, particularly in localities where the atmosphere is destructive of hemp fibre, such ropes should be dipped when dry into a bath containing twenty grains of sulphate of copper per litre of water, and kept in soak in this solution some four days, afterwards being dried; the ropes will thus have absorbed a certain quantity of sulphate of copper, which will preserve them for some time both from the attacks of animal parasite and from rot. The copper salt may be fixed in the fibres of a coating of tar or by soapy water, and in order to do this it may be passed through a bath of boiled tar, hot, drawing it through a thimble to press back the excess of tar, and suspending it afterwards on a staging to dry and harden. In a second method the rope is soaked in a solution of one hundred grammes of soap per litre of water.—*English Mechanic.*

Another New Ozone Apparatus.—The electrical arrangement of apparatus for producing ozone on a large scale has hitherto, or for the most part, consisted in interposing between two conducting coatings charged with electricity of "opposite sign," one of two dielectric layers, and the layer of gas to be ozonized. According to a method proposed by Messrs. Siemens and Halske, both the electric coatings are situated on the same side of the dielectric layer and separated by a shield of insulating material, while at a small distance from the other side of the dielectric layer is situated an insulated conducting plate. Thus currents will pass from the part of the dielectric layer below the one electric coating, through the narrow space in which the gas to be treated is situated, to the insulated plate, and from this back again through the gas to the part of the dielectric layer beneath the second coating.—*Electrical Review.*

The Effect of Electric Light on Plants.—The action excercised by the electric light on plants varies according to the species, and, to solve the problem, numerous researches are still necessary. The only points (says the *Horticultural Times*, in the course of an article describing curious experiments) which seem to be decided are the following: (1) The electric light accelerates assimilation, and often hastens growth and maturation; (2) in some cases it intensifies the colouration of flowers, and sometimes increases the production; (3) nocturnal repose is not absolutely necessary for the growth and development of all the plants; (4) the direct rays produced by the electric arc without a globe have a very injurious effect on flowers too close to the lamp; (5) the intervention between the arc and plants of a globe of ordinary glass arrests all hurtful effects, which are exclusively attributable to violet and ultra-violet rays, and not, as was first supposed, to the production of nitrous acid.

Icebergs and Their Journey from the North.—It does not seem likely that more than one or two hundred large icebergs make their way each year in the only practicable path that can take them beyond the Arctic Circle—that which is afforded by the current which sets out of Davis Strait, and down the Labrador shore, and then eastward into the Atlantic. Although we have as yet but little decided information concerning this ocean-stream, save that afforded by the movements of the berg and floe, we can readily see how it affects the journey of these wandering fragments from the vast Greenland glaciers. Though somewhat inconstant, this current is a tolerably steady stream, setting south through the wide channel which separates the shores of Greenland from those of the many islands which beset the north-east coast of the American continent. By this southward-moving water the ice is propelled out into the open sea. The stream continues to the south, but widens and diminishes in the energy of its flow. It shortly comes in contact with the Gulf Stream, which it somewhat affects, and by which it is much affected. A part of the southward-setting current passes down along the shore of Labrador as a superficial stream of no great width or speed. Another, and perhaps the larger one, flows beneath the Gulf Stream, and in time joins the great, slow-moving procession of Arctic waters which, following the bottom of the deeper sea, in the end attain the equatorial district. For a considerable distance south-east of Greenland there are thus two distinct currents in the ocean waters—a lower, moving southwardly, and an upper or superficial stratum, creeping toward the north. The thin floe-ice, floating altogether within a hundred feet of the surface, is beaten back against the Labrador shore by the surface stream; but the icebergs, because of their greater depth, are driven forward by the under-current in a southwardly direction. Owing to this peculiarity we sometimes may observe the bergs ploughing their way through vast fields of floe-ice as steadfastly as a steamship when it breaks its way in the new-formed ice of a harbour.—*From Icebergs, by Prof. N. S. Shaler, in the August Scribner.*

A man of science in Germany maintains that it is from meteors that all our diamonds come.

American lifeboats are to be furnished with an electric motor and propeller, which will provide not only power but a search light.

Careful scientific investigations show that the average speed of the transmission of earthquake shocks is nearly 16,000 feet per second.

Floods and Their Causes.—It is not necessary to control all the rainfall of a basin in order to control the floods of its river. Again, the river will normally take care of the greater part of its discharge. The channel itself is adequate to the task of carrying away the water of any ordinary rain. Every destructive flood is caused by the comparatively small excess of a storm which is of unusual magnitude. Thus while the quantity of water which appears in any great flood is vast, yet that which brings destruction is only the excess over the carrying capacity of the channel. The destructive waters, therefore, are but a very small percentage of the rainfall, and but a small percentage of the river-flow. The quantities of water to be controlled and the powers to be mastered are so nearly within the conditions where human effort may be available that hydraulic engineers and geologists have again and again considered this problem, not without hope of its solution. Let us see what the problem is, how it varies from region to region, and to what extent it is affected by the operations of man. The rivers of the earth may be divided into two classes, namely, flood-plain rivers and canyon rivers. In flood-plain rivers under conditions of great precipitation the waters rise above the channel banks to overflow the plain which descends seaward or towards the mouth of the river. In canyon streams the channels are cut so deep that the highest flood never reaches the brink of the canyon walls. There are many rivers which are flood-plain streams along parts of their courses, and canyon streams along other parts of their courses. In canyon channels it is evident that human habitations and property are safe when above the flood-line, and this flood-line is always easily discernible, so that little excuse is found for those who suffer from floods under such conditions. But a great majority of rivers are flood-plain streams, and here the conditions of safety are not so readily discovered. A great river ramifies into small rivers, and these ramify into creeks, and the creeks into brooks. Along the course of such a tree-of-rivers all those parts which are not canyon-reaches have flood-plains—that is, comparatively level stretches, back from the river, on either side to the foot of the hill. —*From "Our Recent Floods," by Major J. W. Powell, in North American Review for August.*